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FACULTY OF EDUCATION
The University of Alberta

The Alberta Journal of Educational Research and Consulting Editors

The Alberta Journal of Educational Research is pleased to announce the appointment of a panel of Consulting Editors. The Consulting Editors, representing a variety of interests in educational research, will advise on general matters relating to the journal and supplement the existing process of manuscript assessment. Members of the panel, their institutional affiliation, and a brief description of their research interests follow:

- J. Britton, Emeritus Professor of Education, *University of London*, England; psycholinguistics, the role of language in learning, and the development of writing abilities in school and college.
- J. Calam, *The University of British Columbia*; historiography, history of education, and teacher education.
- M. Connelly, *The Ontario Institute for Studies in Education*; teacher decision-making in curriculum planning, theoretical aspects of curriculum, and science education.
- K. De Clerck, *State University of Ghent*, Belgium; higher education, teacher education, verbal communication, history of education and comparative education.
- R. N. Evans, *University of Illinois at Urbana-Champaign*; teacher education of vocational and manpower teachers, effectiveness of vocational education research, and relationship of student characteristics to choice of curricula.
- R. H. Farquhar, *University of Saskatchewan*; educational administration, administration of higher education, and teacher education.
- E. Gagné, *University of Ottawa*; application of experimental psychology to education, language learning, and international education.
- G. Harman, *The Australian National University*, Canberra, Australia; politics of education, policy-making in education, and higher and postsecondary education.
- S. Hunka, *The University of Alberta*; research design and statistical methods, computer-assisted instruction, and computer application in education.
- J. W. G. Ivany, *Simon Fraser University*; curriculum research and development, analysis of teaching, and instructional styles and cognitive outcomes.

- D. A. MacIver, *University of New Brunswick*; foundations of education, progressive education, and alternative approaches to education.
- D. Nelson, *The University of Alberta*; nature and development of young children in relation to mathematics learning, problem solving, and cognition.
- W. Nesbit, *Memorial University of Newfoundland*; cognitive style of mentally retarded children, hyperactivity, and special education.
- E. Pedersen, *McGill University*; sociology of education, education and social mobility, patterns of school and class organization.

The *AJER* takes great pleasure in welcoming the editors and sincerely hopes that their term of appointment will be challenging and fulfilling.

Henry W. Hodysh

ALAN D. BOWD

University of Victoria

Professional Characteristics of Canadian Educational Psychologists*

One hundred and eighty-seven individuals teaching in educational psychology departments within Canadian universities were surveyed regarding their training, professional activities, and identity. Within group differences according to principal teaching areas are described and some implications discussed. (Dr. Bowd is an Associate Professor in the Faculty of Education, University of Victoria.)

Educational psychologists in Canadian universities make important contributions to teacher education, principally in the areas of learning, child development and educational measurement. They are responsible in large part for the professional education of school counsellors, school psychologists, and special education teachers. Because of the variety of tasks and responsibilities delegated to them within faculties of education, distinctive areas of specialization have developed; consequently, differences in role behaviour among educational psychologists have emerged. Such differences are, of course, also a reflection of differences in training and background. The distinctive functions of educational psychologists have led to the establishment of separate departments of educational psychology in many education faculties. In some cases, educational psychology has been further divided into departments concerned with the education of exceptional children, counsellor education, and educational measurement.

The objective of the present study is to describe the professional characteristics of educational psychologists as a whole and, at the same time, to examine any differences which may characterize specializations within educational psychology. Educational psychologists have maintained an identity distinct from other educators, presumably in part because of their training, professional affiliations and apparent identification as "psychologists." Schmidt (1976) has remarked that "they do not know whether to identify primarily with educators or with psychologists," an

* Based in part upon papers presented to the Annual Meeting, Canadian Psychological Association, Vancouver, 1977, and the Annual Meeting, Canadian Society for the Study of Education, Fredericton, 1977.

observation reinforced by McKeachie's view that educational psychologists "feel like a minority group" vis à vis their colleagues in psychology departments (Warren, 1976). Information concerning the professional characteristics and activities of educational psychologists is necessary if the issue of their "identity" is to be clarified; however, it also bears upon such important concerns as training programs (Keats, 1976; Schmidt, 1976) and the most satisfactory professional organization to meet the needs of the group (Warren, 1976). Most important, questions relating to the future prospects of educational psychology, particularly its role in teacher education, depend upon a clear present understanding of the role behaviour of educational psychologists (Biggs, 1976; Englander, 1976; Nixon, 1976).

Design

Subjects

All full-time members of educational psychology and allied departments (e.g., counsellor education, special education, applied psychology) were listed from current university calendars and surveyed ($N = 285$). The population did not include members of non-departmentalized education faculties or regular psychology departments. 187 questionnaires were returned, representing a response rate of 66%.

Respondents were placed in one of four categories according to the principal current teaching area they indicated. The categories were Learning and Development (LD), Counselling (CO), Special Education (SE) and Measurement (ME). Eleven respondents who stated other than the preceding teaching areas were deleted, and the data for each category analysed separately.

Method

Questionnaires were mailed to all subjects with a covering letter and return addressed envelope. The questionnaire was anonymous; however, provision was made for subjects to indicate their name and address if a preliminary report of results was desired. The form contained 14 items dealing with the following issues:

1. Biographical data (age, sex, degree status);
2. Professional experience (field experience, university teaching experience, current teaching and research interests, time allotted to professional activities);
3. Publications in refereed journals over the previous five years;
4. Professional "identity" (membership in professional organizations and expressed allegiance to them, journals read, identification as a "psychologist" or "educator").

Results and Discussion

The proportion of women teaching in educational psychology departments is 18.7%, a relatively high figure in comparison with 10.3% reported for the social sciences generally (Woodcock & Sullivan, 1975). Within educational psychology departments, the proportion of women is highest in special education (29%) and lowest in the measurement area (4%), a disparity reflecting traditional limiting sex-role expectations. The sample

TABLE 1
HIGHEST DEGREES HELD AS PERCENTAGE OF EACH GROUP^a

	LD	CO	SE	ME	Total
Ph.D.	80	67	71	78	76
Ed.D.	9	21	13	17	13
M.Ed.	5	9	13	4	7
M.A.	4	2	3	-	3
Other	3	-	-	-	1

^a In this and subsequent tables, percentages have been rounded off to the nearest whole number in each category. Principal teaching area divisions are abbreviated thus: LD (learning and development), CO (counselling), SE (special education), and ME (measurement).

TABLE 2
YEARS OF EXPERIENCE IN UNIVERSITY TEACHING AND IN
OTHER EDUCATIONAL SETTINGS

	LD	CO	SE	ME	Total
<u>University</u>					
Mean	11.72	8.63	7.68	10.52	10.14
Standard Deviation	8.04	5.20	3.16	5.46	6.36
<u>Other</u>					
Mean	5.37	6.65	9.68	6.48	6.39
Standard Deviation	4.66	6.40	7.31	6.88	6.00

ranged in age from 27 to 71, with a mean of 43 and little variation across teaching areas.

As indicated in Table 1, 89% of the sample possess the doctorate with only slight variations across teaching areas. The Ed.D. is relatively uncommon among educational psychologists with the highest proportion in counselling.

When the figures for past professional experience (Table 2) are considered in relation to the average age of the group, it is evident that the "typical" individual began university teaching in his or her early thirties after about six years of experience in the school system. The tendency in more applied areas, particularly special education, is for academics to have considerable experience in other educational settings before beginning to teach at the university. Eighty-three per cent of the sample as a whole reported work experience in educational settings other than the university.

When the specific nature of past field experience is examined, clear differences emerge according to areas of specialization. The majority of individuals in all areas have teaching experience in the schools. The very great majority of counsellor educators report experience as school

TABLE 3
PERCENTAGES REPORTING SPECIFIC PAST FIELD EXPERIENCE

	LD	CO	SE	ME	Total
Teacher	72	65	77	78	72
Counsellor	28	84	32	26	40
Special Education Teacher	6	5	45	—	11
Psychologist	42	49	55	22	42
Administrator	32	26	55	43	32
Other	18	14	13	13	17

counsellors. However, the proportion of those in special education who do *not* have related prior experience as a special education teacher is greater than 50%. Outside of the special education area, the number of individuals having worked as special education teachers is virtually zero. While the demand for specialized teachers of exceptional children is increasing, it is evident that there is a parallel need for experienced and qualified individuals to train them within education faculties.

Respondents showed a high level of agreement between stated teaching area and principal research interests. For example, only 7% of all respondents in teaching areas other than special education indicated that their principal research interest was in special education.

TABLE 4
PUBLICATIONS IN REFEREED JOURNALS OVER PREVIOUS FIVE YEARS

	LD	CO	SE	ME	Total
Nil	20.25	20.93	22.58	17.39	19.79
One	13.92	13.95	19.35	4.35	12.83
Two	12.66	9.30	9.68	13.04	11.23
3-5	22.78	37.21	32.26	39.13	29.44
6-10	20.25	11.63	3.23	21.74	16.58
11-20	5.06	4.65	12.90	4.35	6.42
21+	5.06	2.33	---	---	3.74

Subjects were questioned concerning their record of publications in refereed journals over the previous five years. Publication counts of psychologists in Canada (e.g., Nelson & Poley, 1971) have indicated a mean publication rate of about one per person per annum. The median among the educational psychologists forming the present sample is 4 over 5 years; however, approximately one-third of respondents do not publish or are one-study publishers. This figure is lower than has been cited for educators generally (Arlin, 1977), though the discrepancy may be attributable in part to varying methods of data collection.

The highest publication rates were reported for the measurement and

learning/development areas, where respectively 26% and 30% of respondents claimed six publications or better over the previous five years. Publication rates tended to be slightly lower in the more applied areas of counselling and special education, where respectively 35% and 42% of respondents reported no publications or only one over the previous five-year period.

TABLE 5
PERCENTAGES REPORTING CURRENT MEMBERSHIP IN
PROFESSIONAL ORGANIZATIONS

	LD	CO	SE	ME	Total
Canadian Psychological Association	46	41	26	13	41
Canadian Society for the Study of Education	52	14	45	48	42
Canadian Guidance and Counselling Association	4	74	6	4	20
Council for Exceptional Children	9	12	81	4	21
American Educational Research Association	39	7	29	65	35

Membership in professional organizations is shared almost equally between two “umbrella” organizations (C.P.A. and C.S.S.E.) with C.G.C.A. and C.E.C. accounting for more specific applied interests in counselling and special education. A large proportion of educational psychologists from fields other than counselling belong to A.E.R.A.; however, when asked to indicate the association to which they felt primary allegiance, only 9% elected A.E.R.A.. This compares with 18% choosing C.P.A., 14% C.S.S.E., 14% C.G.C.A., and 7% C.E.C. Clearly there is considerable overlap in membership between organizations, though it appears that both C.P.A. and C.S.S.E. are serving educational psychologists as “parent” organizations for the disciplines of psychology and education. This conclusion tends to be supported by the fact that C.P.A. is the preferred organization of respondents who identify as “psychologists” while C.S.S.E. is preferred by those who identify first as “educators.”

As shown in Table 6, educational psychologists report spending the largest proportion of their time in teaching with about equal added emphasis upon field-related and research activities. Only in the counselling area does field-related activity clearly demand a larger proportion of time than research.

Whether educational psychologists identify as educators or as psychologists depends upon their teaching area, professional experience, and training. As indicated in Table 7, large majorities of individuals in special education and measurement identify as “educators” with those who identify as “psychologists” predominating in counselling and learning/development. One reason for this may be that individuals specializing in measurement and special education tend to be concerned with specific educational questions and problems upon which psychological theory and

TABLE 6
MEAN PERCENTAGES OF TIME SPENT ON PROFESSIONAL ACTIVITIES

	LD	CO	SE	ME	Total
Teaching	51	48	45	45	48
Applied: field and community related	19	31	23	22	23
Research	23	15	24	24	22

^aSeveral respondents indicated additionally that administrative activities were significant.

TABLE 7
PERCENTAGES IDENTIFYING AS "PSYCHOLOGIST"
OR AS "EDUCATOR"

	LD	CO	SE	ME	Total
Psychologist	51	49	29	26	45
Educator	47	42	61	57	47
No response	4	9	10	17	8

research bear. Counselling and learning/development, however, might tend to attract more individuals whose *primary* interest is in psychology followed by its applications in an educational context.

Conclusions

The present survey examined educational psychologists employed in education faculties organized on a departmental basis only. A limitation this has placed upon the sample is the consequent absence of Francophone psychologists from the majority of Quebec universities.

Schmidt's observation that educational psychologists do not know whether to identify as psychologists or as educators is not strictly correct. In actual fact only 8% of the present sample were unable to make the choice. It is more accurate to say that about half identify as psychologists and half as educators. The significance of this fact becomes apparent when one considers the diversity of professional interests and activities represented by educational psychologists as a whole. Quite clearly there is no single factor which brings them together other than a common concern with the application of psychological principles to education.

Virtually every area of psychology has had some application in educational settings and has potential educational significance. Thus the once popular definition of educational psychology as "that part of psychology that teachers ought to know" has little meaning (Nixon, 1976). Rather, educational psychology is better understood as a process rather than a content area. Psychology becomes educational psychology when its principles are applied to educational problems, and this is the function of educational psychologists.

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Note

1. University of Saskatchewan, Ontario Institute for Studies in Education.

KEVIN MARJORIBANKS

University of Adelaide

Personality and Environmental Correlates of Cognitive Performance and School Related Affective Characteristics: A Regression Surface Analysis

Regression surface analysis was used to examine relationships between children's personality and measures of cognitive and school related affective characteristics at different levels of family and school environments. Data were collected on 250 12-year-old children and their parents. Regression surfaces were constructed from models which examined possible linear, curvilinear and interaction relations between the variables. The Jackknife technique was used to adjust the significance levels in the analysis. Results indicate that there are significant sex differences in the relations between personality and measures of cognitive and affective characteristics at different environment levels. A number of general propositions are suggested, for example: that changes in personality are associated with changes in the intelligence test scores of girls at different levels of the family environment, but not related for boys; and that at each level of personality, increases in the favourableness of family environments are related to increases in the intelligence test scores for boys, but not for girls. A set of propositions are suggested for the relations between personality, family and school environments, and the affective characteristics of children. (Dr. Marjoribanks is a Professor in the Department of Education at the University of Adelaide, South Australia.)

Although there have been many investigations into the relationships between the personality of children who are of late elementary or early secondary school age and measures of cognitive performance and school related affective characteristics, the findings remain inconsistent and inconclusive. For example, studies of British children by Jones (1960), Rushton (1966), Savage (1966), Ridding (1967), Eysenck and Cookson (1969), and Savage and Savage (1973) suggest that the extraverted child tends to perform better than the introverted child on measures of cognitive performance. The finding has been supported in Uganda by Honess and Kline (1974) and in a study by Orpen (1976) of Xhosa-speaking Blacks and

Afrikaans-speaking Whites in South Africa. Entwistle and Welsh (1969) found that among bright boys, extraversion was negatively related to academic attainment but for low ability boys, the relation was positive, while Entwistle and Cunningham (1968) found that girls who were stable extraverts and boys who were stable introverts formed superior academic groups. Frost (1968) proposes that for girls there is a positive relationship between extraversion and attainment but for boys the relation is negative which has the effect of producing an overall U-shaped relationship between extraversion and attainment. No significant relations between extraversion and scores on Raven's Progressive Matrices are reported by Orme (1975) while Jensen (1973) found that, while extraversion had negligible correlations with intelligence, it had low but significant correlations with the academic achievement scores of white, Negro, and Mexican-American children. A high correlation between extraversion and reading age was found by Elliott (1972) but there was a negligible association between extraversion and intelligence when mental age and reading age were held constant.

For the relation between neuroticism and cognitive performance, Savage (1966), Ridding (1967), Honess and Kline (1974) found no association while Callard and Goodfellow (1962), Rushton (1966), Entwistle and Cunningham (1968), and Jensen (1973) found significant negative linear correlations. Eysenck and Cookson (1969) propose that the relation between neuroticism and performance scores is negative with the regression being slightly curvilinear while Brown (1970) found a definite curvilinear relation. But Entwistle and Cunningham (1968) conclude that the relationship between neuroticism and attainment is linear and that the hypothesis of a nonlinear relation must be rejected.

Studies relating personality and other school related affective measures are less numerous than those linking personality and cognitive performance. Instead of examining relations between personality and affective measures, studies generally use both sets of measures as predictors of achievement performance (e.g., see Cattell, Sealy & Sweney, 1966; Cattell & Butcher, 1968; Radcliffe, 1972). In a study of English secondary school children, Banks and Finlayson (1973) found a weak relationship supporting the proposition that, compared with extravert children, introverts have more interest in books and intellectual problems and are more able and willing to persist in working at an academic task. Using the Cattell Personality Questionnaire (HSPQ), Josephs and Smithers (1975) found that students who had more positive attitudes to school tended to be more conservative (Q_1), controlled (Q_3), conscientious and persistent (G), shy and sober (H), practical (M), somewhat more sober (F), more group dependent (Q_2) and more apprehensive (O). As the authors suggest, no clear picture emerges in the relation between the constructs of extraversion and neuroticism and school related attitudes. Jackson and Getzels (1959) conclude that school related attitudes are a reflection of basic personality variables and are unrelated to intellectual ability and academic achievement while Williams (1970) found that students with positive school related affective measures obtained significantly higher scores on a set of ability, achievement, and personality variables.

The findings in the research remain equivocal partly because the studies

have relied on the use of restricted statistical techniques such as product-moment correlations which reveal only bivariate relations and analysis of variance techniques which require the grouping of variables into levels. Simple additive multiple regression equations have been used to examine how much extra variance in cognitive and affective scores is associated with the addition of personality measures to the equations. The results generated from these equations depend on the order in which personality measures are added to the equations. All of these statistical techniques have prevented the full character of the relationships between personality and measures of affective characteristics and cognitive performance from being revealed.

The inconsistencies in the findings are related also to the failure of most of the studies to examine the relations between personality and measures of cognitive performance and affective characteristics at different environment levels. As Lavin (1965, p. 100) proposes, the "disappointing state of affairs" in the research may be due to the circumstance that virtually all studies "conceive of the individual as if he were operating in a social vacuum." Similarly, Getzels (1969) suggests that research relating personality characteristics and achievement "might be more powerful if the social setting in which educational performance takes place were conceptualized and used as a significant variable with which personality interacts" (p. 100). In the present study an attempt is made to overcome some of the conceptual and statistical limitations of previous research. Regression surfaces have been plotted to investigate relations between personality and measures of cognitive performance and school related affective characteristics, at different levels of family and school learning environments.

Method

Sample

Approximately 550 Australian 12-year-old children were tested to obtain measures of personality, school related affective characteristics, perceptions of classroom and school learning environments and intelligence. Family environment data were collected from interviews with the parents of 250 children, 130 boys and 120 girls. Where possible two parallel pools of families, based on social status background, were formed. The purpose of the substitute pool was to provide a set of alternate families which could be used in the study if families from the first pool did not agree to participate. The final sample included 250 children and their parents.

Measures

Family environment. From a set of studies which had examined the relations between the environments of families and the cognitive and affective characteristics of children (e.g., Rosen, 1959; Dave, 1963; Wolf, 1964; Plowden, 1967; Weiss, 1974; Marjoribanks, 1972; Walberg & Marjoribanks, 1973), a set of six environmental process variables were identified. These variables were labeled as parents': expectations for the child, expectations for themselves, concern for the use of language within the family, reinforcement of educational expectations, knowledge of child's educational progress, and the family involvement in educational activities.

The process variables provided the framework for the construction of an environmental measure which was an adaptation of a previous instrument (see Marjoribanks, 1972). The measure which was in the form of a semistructured home interview schedule was used to elicit responses from parents. For each item a set of alternate responses was supplied to the interviewer. In addition, an "other answer" space was provided so that the interviewer could record a response which was not covered by those supplied. As well as obtaining a measure of the intensity of the present learning environment operating in the family, the schedule attempted to gain a measure of the cumulative nature of the environment. For example, as well as asking, "How much education do you expect the child to receive?", the schedule also included a question to estimate how long the expectations had been held. The scales had theta reliability estimates greater than .80 (see Armor, 1974). Scores on the scales were analyzed using principal component analysis and from the six environment scales, two environment factors were identified which were labeled: parents' press for achievement (loaded on parents' expectations for the child, expectations for themselves, concern for the use of language in the home, reinforcement of expectations) and parent-child involvement (loaded on knowledge of child's educational progress and the family involvement in educational activities). Factor scores were obtained on the two family environment factors for each child.

School Environment. A new school environment schedule was developed by selecting items from instruments constructed by Stern (1963), Walberg (1972), and Trickett and Moos (1973). The items which were selected had been shown to have moderate to high predictive validities in relation to cognitive and affective measures. The new scale is of a Likert-type format consisting of 50 items which attempt to assess children's perceptions of classroom and school learning environments. Scores on the items were analyzed using principal component analysis. After eliminating items with small factor loadings ($\leq .40$) the remaining items were refactored, producing two factor scales. The scales which were labeled the intellectual orientation of the school and the punitive nature of the school environment both had theta reliability estimates of approximately .85.

The intellectual orientation scale consisted of 14 items which were of the form: new ideas are met with immediate enthusiasm in this school, teachers here put a lot of energy and enthusiasm into their teaching, teachers encourage students to think about exciting and unusual careers, and in this school teachers go out of their way to help you. Included in the punitive environment scale were 16 items of the form: students in this school are sometimes punished without knowing the reason for it, in this school teachers very often make you feel like a child, students are often made to take the blame for things whether they did them or not, those in charge of this school are not very patient with students, and sometimes teachers embarrass students in my classes for not knowing the right answers to questions. An intellectual orientation of the school and a punitive school environment score for each child was obtained by summing the scores on the items which made up the two factors.

Cognitive Performance. The general intellectual ability of the children was assessed using the Otis Intermediate Test - Form AB, which has

acceptable reliability estimates and high predictive validities in relation to other academic achievement measures.

Personality. The CPQ, Form A devised by Cattell (see Cattell, Eber & Tatsuoka, 1970) was used to assess children's personality. Data on 14 personality constructs are provided by the schedule. When the scores on the variables were factor analyzed and the factors rotated, four second stratum personality factors were identified. There is a modest correspondence between these four factors and second stratum factors isolated in previous studies (e.g., see Gorsuch & Cattell, 1967; Warburton, 1972; Nesselroade & Baltes, 1975; Howarth, 1976). The factors were labeled: contemplative-impatience (loaded strongly on conscientious [G^+], dependent [I^+], apprehensive [O^+], controlled [Q_3^+]); self-reliant-subduedness (excitability [D^+], assertive [E^+], circumspect individualism [J^+], shrewdness [N^+], high ergic tension [Q_4^+], enthusiastic [F^+]); adjustment-anxiety (participating [A^+], emotionally stable [C^+], self-assured [O^-], adventurous [H^+]); and extraversion-introversion (aggressive [E^+], enthusiastic [F^+], worldly [N^+]). Factor scores were obtained on the four second stratum personality factors for each child.

School Related Affective Characteristics. Measures constructed by Barker Lunn (1969, 1970) and Summer (1972) and modified for the present study were used to assess children's school related affective characteristics. Both scales are of a Likert-type format and each consists of 50 items. Factor scaling techniques were used to examine the responses to the two schedules. From the first schedule five factor scales were isolated which were identified as: enthusiasm for school, academic self-concept, loneliness at school, enthusiasm for disruptive behaviour, and children's educational and occupational expectations. From the second schedule, two factors were identified and labeled: alienation from school and child's academic orientation. The scales had theta reliabilities ranging from .70 to .87. From the seven affective factors, two second stratum factors were isolated and named: child's commitment to school (loaded on enthusiasm for school⁺, enthusiasm for disruptive behaviour⁻, educational and occupational expectations⁺, alienation from school⁻, academic orientation⁺) and school self-confidence (academic self-concept⁺, loneliness at school⁻). Factor scores were obtained for each child on the two second stratum school related affective factors.

Therefore the study examined relations between personality (contemplative-impatience, self-reliant-subduedness, adjustment-anxiety, extraversion-introversion) and measures of intelligence and school related affective characteristics (commitment to school, school self-confidence) at different levels of the family environment (parents' press for achievement, parent-child involvement) and school environment (intellectual orientation of the school, punitive nature of school environment).

Results

The first investigation of the relations between the variables involved an analysis of zero-order correlations. In Table 1, the results show that there are sex differences in the relationships between the personality and environment measures and the intelligence and affective scores. For

TABLE 1
ZERO-ORDER CORRELATIONS BETWEEN PERSONALITY, ENVIRONMENT
AND MEASURES OF INTELLIGENCE AND SCHOOL RELATED
AFFECTIVE CHARACTERISTICS

	Intelligence		Affective Characteristics			
			Commitment to School		Self-Confidence in School	
<u>Personality</u>						
Contemplative	-04	(13)	30**	(49**)	-15	(-06)
Self-Reliant	01	(21*)	-45**	(-21*)	-21*	(-05)
Adjustment	08	(33**)	22**	(33**)	65**	(53**)
Extraversion	12	(32**)	-28**	(-20*)	17*	(22**)
<u>Family Environment</u>						
Parents' Press for Achievement	38**	(17)	32**	(09)	17*	(08)
Parent-Child Involvement	35**	(-15)	27**	(-04)	17*	(-22*)
<u>School Environment</u>						
Intellectual Orientation of School	-16	(-07)	38**	(40**)	15	(-02)
Non-Punitive Nature of School	01	(10)	49**	(37**)	28**	(20*)

Note. Decimal points have been omitted and coefficients for girls are in parentheses.

* $p < .05$
** $p < .01$

example, while the boys' personality scores are not related to intelligence, three of the personality factors have significant low to moderate relationships with girls' intelligence test scores. Also, the family environments of boys have moderate concurrent validities in relation to boys' affective and intelligence scores while for girls only one relationship reaches statistical significance. The zero-order correlations suggest that children who tend to be contemplative, subdued, adjusted, and introvert have a greater commitment to school than children who are more patient, self-reliant, anxious, and extravert. As might be expected, children who express a positive commitment to school perceive the school as having an intellectual orientation and being nonpunitive. Also, children who indicate a high self-confidence in school tend to be well adjusted, extravert, and perceive the school environment to be nonpunitive.

Relationships between the measures were investigated further by plotting regression surfaces using raw regression weights generated from regression models which included terms to account for possible linear, curvilinear, and interaction relations. Because prior research has produced conflicting evidence regarding sex differences in relations between personality and measures of intelligence and affective characteristics, and as the zero-order correlations suggested some sex differences in the

TABLE 2
RAW REGRESSION WEIGHTS FOR MULTIPLE REGRESSION OF
INTELLIGENCE AND SCHOOL RELATED AFFECTIVE CHARACTERISTICS
ON PERSONALITY AND FAMILY ENVIRONMENT

Predictor Variables	Criterion Variables					
	Intelligence		Commitment to School		Self-Confidence in School	
Parents' Press for Achievement	3.760**	(1.450)	.362**	(.098)	.094	(.048)
Contemplative	-.848	(.885)	.515**	(.465**)	-.144	(-.028)
Multiple R	.39	(.22) ^a	.43	(.50)	.22	(.10) ^a
Press for Achievement	3.747**	(1.427)	.351**	(.112)	.084	(.048)
Self-Reliant	.298	(1.262*)	-.600**	(-.185*)	-.137*	(-.021)
Multiple R	.39	(.27)	.54	(.23) ^a	.26	(.10) ^a
Press for Achievement	3.759**	(1.410)	.385**	(.098)	.100*	(.042)
Adjustment	1.645	(2.791**)	.474*	(.400**)	.666**	(.308**)
Multiple R	.40	(.37)	.39	(.34)	.67	(.53)
Press for Achievement	3.648**	(1.662)	.420**	(.091)	.080	(.057)
Extraversion	1.823	(4.494**)	-.887**	(-.365)	.21	(.213*)
Multiple R	.39	(.38)	.45	(.21)	.21 ^a	(.24)
Parent-Child Involvement	6.024**	(-2.406)	.521*	(-.195)	.164	(-.206)
Contemplative	-.866	(1.047)	.516**	(.478**)	-.145	(-.015)
Multiple R	.36	(.22)	.39	(.50)	.22 ^a	(.22) ^a
Parent-Child Involvement	6.041**	(-2.321)	.465*	(-.047)	.136	(-.208*)
Self-Reliant	.480	(1.345*)	-.490**	(-.182*)	-.133**	(-.015)
Multiple R	.35	(.27)	.50	(.22) ^a	.25	(.22) ^a
Parent-Child Involvement	6.033**	(-1.950)	.571**	(-.050)	.180*	(-.190*)
Adjustment	1.700	(2.771**)	.478*	(.400**)	.668**	(.304**)
Multiple R	.37	(.36)	.35	(.34)	.67	(.57)
Parent-Child Involvement	6.026**	(-1.771)	.539**	(-.106)	.160	(-.193*)
Extraversion	2.977	(4.164**)	-.760**	(-.383*)	.224	(.191*)
Multiple R	.38	(.34)	.39	(.20) ^a	.23 ^a	(.30)

Note. Figures for girls are in parentheses.
* Value of raw regression weight exceeds twice its standard error.
** Value of raw regression weight exceeds three times its standard error.
^a Multiple R is not significant at .05 level.

relations, the regression surface analysis was conducted separately for girls and boys.

In the study, a simple random sample was not used. Therefore, in the regression analysis the Design Effect for each raw regression weight was estimated using the Jackknife technique (Mosteller & Tukey, 1968; Finifter, 1972). The significance levels for the regression weights were recalculated using the formula: standard error for sample estimate = (Design Effect)^{1/2} × simple random sample standard error (Kish, 1965; Ross, 1976). The Jackknife estimates led to a reduction in the number of regression weights that were significant. Therefore, a second stage of the regression analysis was conducted in which variables that no longer had significant relations

TABLE 3
RAW REGRESSION WEIGHTS FOR MULTIPLE REGRESSION OF
INTELLIGENCE AND SCHOOL RELATED AFFECTIVE CHARACTERISTICS
ON PERSONALITY AND SCHOOL ENVIRONMENT

Predictor Variables	Criterion Variables					
	Intelligence		Commitment to School		Self-Confidence in School	
Non-Punitive School Environment	.029	(.107)	.127**	(.061**)	.044**	(.027*)
Contemplative	-.605	(.782)	.382*	(.397**)	-.193*	(-.058)
Multiple R	.04 ^a	(.15) ^a	.53	(.54)	.35	(.23) ^a
Non-Punitive Environment	.018	(.267)	.106**	(.082**)	.032*	(.023)
Self-Reliant	.105	(1.510*)	-.442**	(-.114)	-.087	(.001)
Multiple R	--	(.26)	.57	(.39)	.30	(.19) ^a
Non-Punitive Environment Adjustment	-.023	(.057)	.132**	(.077**)	.024*	(.011)
Multiple R	1.495	(2.765*)	.298	(.328**)	.632**	(.298**)
	.08 ^a	(.33)	.50	(.46)	.67	(.54)
Non-Punitive Environment Extraversion	.117	(.238)	.125**	(.085**)	.051**	(.027*)
Multiple R	3.145	(4.549**)	-.382	(-.289)	.381**	(.233*)
	.13 ^a	(.35)	.50	(.400)	.38	(.32)
Intellectual Orientation of School	-.498	(-.250)	.123**	(.075*)	.029	(.001)
Contemplative	-.311	(1.173)	.478**	(.384**)	-.152	(-.027)
Multiple R	.17 ^a	(.18) ^a	.46	(.55)	.22 ^a	(.06) ^a
Intellectual Orientation Self-Reliant	-.509	(-.040)	.115**	(.103**)	.022	(-.004)
Multiple R	-.162	(1.257*)	-.568**	(-.111)	-.131*	(-.023)
	.17 ^a	(.21) ^a	.55	(.42)	.25	(.06) ^a
Intellectual Orientation Adjustment	-.517	(-.292)	.129**	(.096**)	.021	(-.019)
Multiple R	1.608	(3.084**)	.420*	(.315*)	.655**	(.326**)
	.19 ^a	(.36)	.43	(.47)	.66	(.55)
Intellectual Orientation Extraversion	-.440	(-.008)	.113**	(.105**)	.037*	(.004)
Multiple R	1.825	(4.300**)	-.533*	(-.232)	.298*	(.212*)
	.19 ^a	(.32)	.42	(.41)	.26	(.22) ^a

Note. Figures for girls are in parentheses.

* Value of raw regression weight exceeds twice its standard error.

** Value of raw regression weight exceeds three times its standard error.

^a Multiple R not significant at .05 level.

with the measures of intelligence and affective characteristics were deleted from the regression models. In the second analysis, the Jackknife technique was used again to estimate Design Effects and thus to adjust further the significance levels of the regression weights.

Regression surfaces were generated from equations including the raw regression weights shown in Tables 2 and 3. It was found that the two-term equations accounted for as much significant variance in the intelligence and affective measures as complex many-term equations containing quadratic terms (to test for nonlinearity) and product terms (to test for interactions). In these more complex models, the raw regression weights

between the intelligence and affective scores and the quadratic and product predictor terms were not significant after adjusting for Design Effects.

As it is not possible in the space available to present all the regression surfaces that were generated from the data, four surfaces have been plotted in two figures. The surfaces reflect some of the different relations that are present among the variables. For the construction of the surface the scores on each variable were converted to standard scores with a mean of 50 and a standard deviation of 10. In Figure 1, the surfaces show the regression-fitted relations between the adjustment-anxiety personality factor and intelligence at different levels of parents' press for achievement. The shape of the boys' regression surface reflects those relations in Tables 2 and 3 in which the personality factors are not related to the intelligence and affective measures at different environment levels. The girls' surface represents regression models in which the personality factors are associated with intelligence and the affective measures at different environment levels, but where the measures of intelligence and affective characteristics are not related to the environment scores at different levels of the personality factors. For example, in Figure 1 at each level of the adjustment-anxiety factor, increments in parents' press for achievement for boys are associated with sizeable increases in the regression-estimated intelligence test scores. But at different levels of press for achievement, changes in boys' personality from anxiety to adjustment are not associated with changes in intelligence scores. The girls' surface shows a different set of relations. At each level of the anxiety-adjustment factor, increments in parents' press for achievement are not associated with increments in intelligence. But at each family environment level, as the girls' personality changes from anxiety to adjusted, there are increments in the regression-estimated intelligence scores.

In Figure 2 the surfaces show the regression-fitted relations between the self-reliant-subduedness personality factor and commitment to school, at

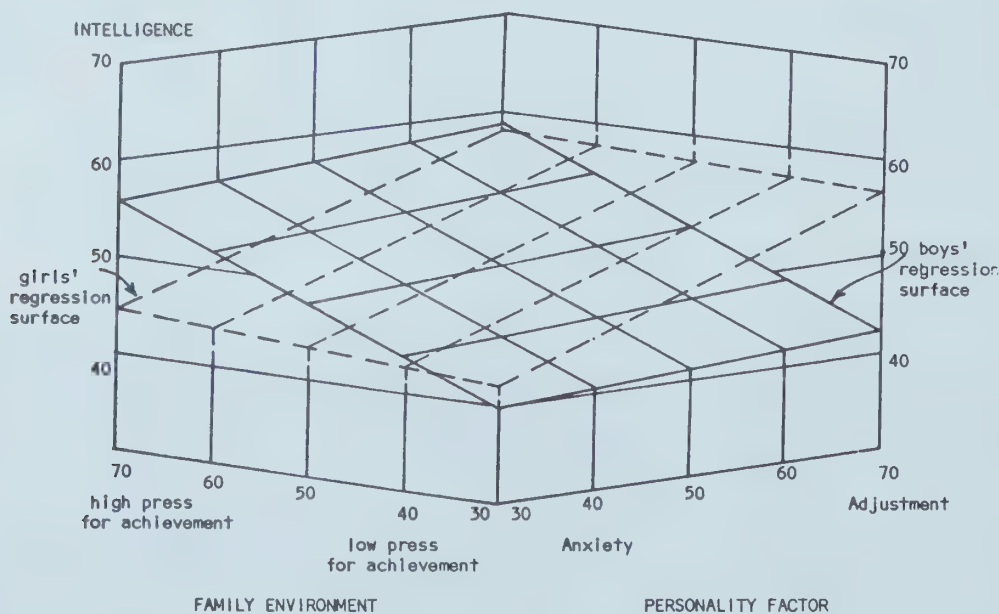


Figure 1. Fitted-intelligence scores in relation to the anxiety-adjustment factor and parents' press for achievement.

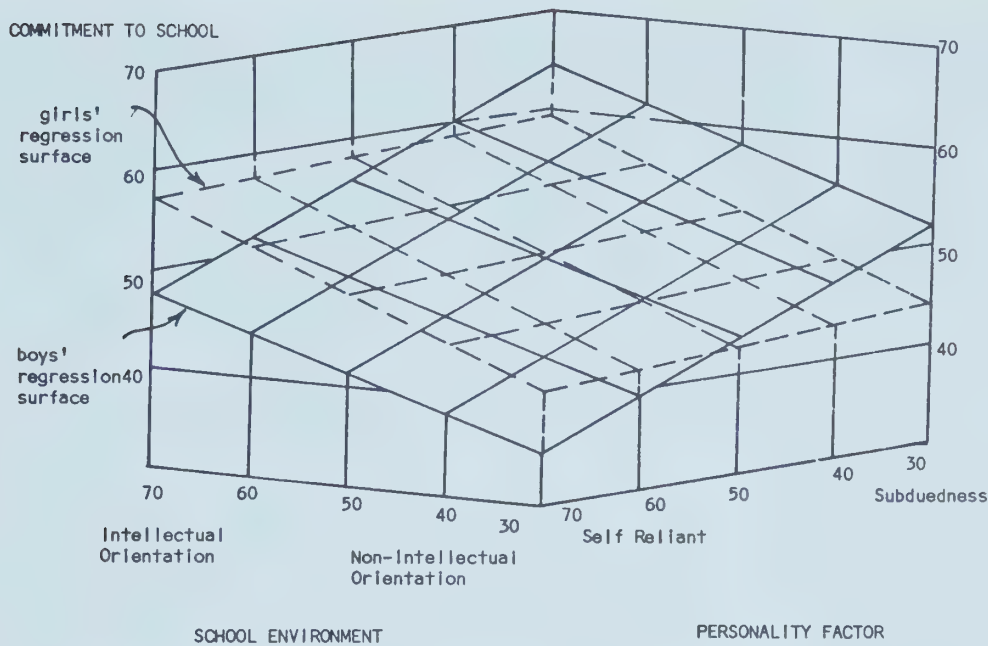


Figure 2. Fitted-commitment to school scores in relation to the self-reliant-subduedness factor and children's perception of the intellectual orientation of the school.

different levels of children's perception of the intellectual orientation of the school environment. The boys' surface reflects those regression equations in which intelligence or the affective scores are related to both personality factors and environment scores. The surface shows that boys who are self-reliant (excitable, assertive, circumspect individualistic, shrewd, enthusiastic, high ergic tension) and who perceive the school to have a non-intellectual orientation exhibit a low level of commitment to school. That is, they express little enthusiasm for school, enthusiasm for disruptive behaviour, low educational and occupational expectations, alienation from school, and low academic orientation. If self-reliant boys perceive the school as having an intellectual orientation, their commitment to school increases. At each level of boys' perception of the intellectual orientation of the school, changes in the personality factor from self-reliant to subduedness are associated with a more positive commitment to school. But even at a high level of subduedness, if boys perceive the school to have a non-intellectual orientation, then commitment to school remains relatively depressed. Again, the girls' surface indicates the sex-related differences in the associations among the variables. At each level of the self-reliant-subduedness factor, changes in the girls' perceptions of the school environment are associated with changes in their commitment to school, which is a relation similar to that of the boys. But at each environment level, changes in girls' personality from self-reliant to subduedness are not related to changes in their commitment to school.

Discussion

By using regression models to generate regression surfaces and by including measures of family and school environments, the present study has gone beyond much of previous research which has examined relations between personality and measures of cognitive performance and school

related affective characteristics. From the findings a number of general propositions are suggested. Because of the important sex differences that were present in the results, the propositions are stated separately for boys and girls. For boys the results suggest that: (a) at each level of family environment, changes in personality factors are not associated with changes in intelligence scores; (b) at each level of personality, increases in the favourableness of the family environment are related to increments in intelligence; (c) commitment to school is related to both personality and environment measures. That is, boys who (i) have family environments which exert a high press for achievement and exhibit a high amount of parent-child involvement and (ii) perceive the school environment to have an intellectual orientation and to be nonpunitive, may not necessarily express a higher commitment to schools than boys who: (i) have families exerting little press for achievement and low parent-child involvement and (ii) perceive the school as having a non-intellectual orientation and as being punitive. But if the supportive family environment and the positive perceptions of school are associated with personality characteristics defined as contemplative, subdued, adjusted and introvert, boys are likely to indicate a high commitment to school; and (d) boys who perceive the school as being a nonpunitive environment and who are extravert, impatient, and adjusted indicate a high self-confidence in school while boys who perceive the school environment as being punitive and who are introvert, contemplative, and anxious exhibit low self-confidence in school.

For girls, the findings suggest the general propositions that: (a) at each level of family environment, changes in personality are associated with changes in intelligence test scores; (b) at each level of personality, changes in the family environment are not associated with changes in intelligence scores; (c) commitment to school is related to the personality factors and perceptions of the school environment but not to the family environment. In general, at any level of the family environment a high commitment to school is associated with girls who are contemplative, well adjusted, and introvert. Also, girls who are well adjusted and contemplative and who perceive the school as being nonpunitive and intellectually oriented have a very positive commitment to school, while girls who are anxious and impatient and who perceive the school as being punitive and non-intellectually oriented have a relatively low commitment to school; and (d) girls who are well-adjusted rather than anxious have a higher level of self-confidence in school.

The inclusion of environmental variables in the analysis of the relations between personality and measures of cognitive and affective characteristics helps to explain some of the inconsistencies in previous research, especially the equivocal findings that have been found for girls and boys. What is required now is a set of studies which investigate relationships between personality and other measures of cognitive performance and affective characteristics at different environment levels, for girls and boys of different age groups. Only when such research is completed will we have a real understanding of the complex nature of the relations between personality and measures of cognitive and affective characteristics.

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Basic Dimensions in Characteristics of Classroom Groups

A diverse battery of individual and group measures was obtained for 144 high school physics classes. Several sets of factors were identified by factor analysis of the battery, one of which was a predetermined rotation based on Bales' model of interpersonal behaviour in groups. The model-based rotation, comprising three factors named Achievement, Cohesiveness, and Status, compared favourably to principal components and Varimax rotation with respect to interpretability and variance accounted for. However, the roles played in the factor structure by measures of authoritarianism and interest in subject matter suggest that some modification of the Bales dimensions may be appropriate for describing classroom groups as wholes. (Dr. Ahlgren is an Associate Professor of Curriculum and Instruction, Center for Educational Development, University of Minnesota, Twin Cities; Dr. Walberg is a Professor of Education, College of Education, University of Illinois at Chicago Circle.)

Bales (1968) has described a three-dimensional model of interpersonal behaviour, which he derived from replicated factor-analytic studies of behaviour observations in small groups. An attempt is made in the present study to show that a very similar set of three dimensions is successful in characterizing groups as wholes. The data are class means, from a national sample of high school physics classes, on perceptions of classroom climate and on a variety of academic, biographical, and personality variables. The success of fitting the model to the data will be evaluated on the basis of (1) the model's parsimony in accounting for variance in a large battery of class variables, and (2) the relatedness of the three hypothesized dimensions to other educational variables.

In Bales' studies, interpersonal interactions within small groups are observed and classified by nonparticipants. Three factors that represent

patterns of observations are computed for each individual in the group. Each individual in a group can be represented by a point inside a cube defined by these three dimensions. The up-down dimension Bales calls “power”; it represents the degree of individual dominance, prominence, or status in the group. A person with high group status may be metaphorically understood as being high in this vertical dimension, near the top of the cube. The left-right dimension is “affection”; acceptance and affiliation are associated with an individual located near the right side of the cube, while rejection and hostility are associated with an individual located near the left side. The forward-backward dimension is “achievement,” the extent to which the individual promotes group tasks and achieves group goals. A person who occupies a forward position conforms to group norms and helps the group to accomplish its tasks; a person in a backward position prevents the group from achieving. In Bales’ model, the relations between any two people in the group are determined in large part by their relative positions in the cube.

An important aspect of the Bales model is the independence of the three dimensions: the position of a group member on one dimension should not be predictable from his or her position on the other dimensions. Thus, for example, a person who advances group goals may engender either cohesiveness or hostility in the group and may be either high or low in status.

Bales cites evidence for the three dimensions in repeated factor analyses of the frequencies of categories of observed *individual* behaviour within small groups. Although Bales’ instruments have often been used within classroom groups, his model apparently has not been used to characterize groups as wholes. The present study uses as units of analysis the *group means* — specifically, the class means of a national sample of 144 high school physics classes (containing about 3,700 students). Needless to say, the correlation structure for group means may be quite unlike that for individuals within groups.

The context of the present research, then, is fundamentally different from the work of Bales. His units of analysis were individuals in the same group who interacted with one another; and the intragroup measures were ipsative — high and low scores are relative to the scores of interacting members of the same group. The units of analysis in the present study were noninteractive and represent the pooled perceptions of all members of each group. Accordingly, the Bales dimensions shift somewhat in meaning when group means are considered. Status is not relative status within a group, but group emphasis on status, interpersonal affect becomes a generalized group affective tone, and achievement becomes group emphasis on achievement.

(The teacher, by virtue of his special role, is not properly a perceiver of the learning climate. He or she is considered as an external constraint, rather than a member of the interacting learning group. Examination of the items comprised by each scale will confirm that the teacher is not considered in competition for “status,” or a receiver of “favouritism,” etc.)

The present study also differs from the work of Bales in the incorporation of several diverse domains of measurement — personality, biographical, and academic. Substantial contributions of these concrete

variables in the factor patterns provide an economical way of demonstrating the pertinence of the dimensions of group perception to education processes.

Method

Sample Characteristics

The opportunity for the study arose in the evaluation of a government-funded curriculum project, Harvard Project Physics. Data were collected from the current classes of two sets of teachers: (1) 36 teachers in a simple random sample from the National Science Teachers Association's list of about 16,000 high school physics teachers in the continental U.S. who had agreed to teach a new course, Harvard Project Physics (for details of the sampling procedure, see Walberg, Welch & Ahlgren, 1968) and (2) 21 teachers who had volunteered to teach the course in previous years. Teachers in both groups were more likely to teach in large, advantaged school districts (where there are more physics teachers). Mean IQ's for students in both groups were 115, with a standard deviation of 15. The sample thus consisted almost entirely of students with above-average intelligence and the academic motivation to take a physics course, which is generally regarded as one of the most difficult subjects in high school. (What may be missing in group diversity may have been gained in conscientious responses to the instruments.) Many teachers had more than one Harvard Project Physics class, and the total number of classes in the study was 144. Class size ranged from 19 to 32, with a mean of 25.

Group Measures

The set of 57 variables is listed in outline in Table 1. The perceived class properties were the class means on the 14 scores of the *Learning Environment Inventory*, a measure of the social environment of learning. (See Walberg, 1969a, for a rationale of the instrument and validities for

TABLE 1
VARIABLES INCLUDED IN FACTOR ANALYSIS

Learning Environment	Personality	Biographical	Academic (Pre and Post)
Intimacy	Dogmatism	Books in Home	Cognitive
Friction	Authoritarianism	Nonschool Reading	Science Understanding
Cliqueness	Rigidity	Nonschool Study	Science Processes
Satisfaction	Need Achievement	Opportunity for Creativity	Physics Achievement
Speed	Need Order	Career Discussion with Adults	
Difficulty	Need Affiliation	Like School	Noncognitive
Apathy	Need Change	School Marks	Science Interest
Favouritism		Perfectionism	Physics Activities
Formality	IQ	Perseverance	Physics Interest
Goal Direction		Importance of Intelligence	
Democracy		Question Teachers	
Disorganization		Creative Imagination	
Diversity		Group Leader	
Environment		Visual Artist	
		Scientist	
		Performing Artist	
		Musician	
		Writer	
		Senior	
		Plan College Entrance	
Class Size			
Class Size--squared			
Girl Ratio			

TABLE 2
EXAMPLE ITEMS FOR NINE SCORES FROM THE
LEARNING ENVIRONMENT INVENTORY

Score	Example Item (from the 7 comprising the score)
Friction	"Students are constantly challenged."
Cliqueness	"Certain students work only with their close friends."
Satisfaction	"The students enjoy their class work."
Speed	"The pace of the class is rushed."
Difficulty	"Students are constantly challenged."
Apathy	"Failure of the class would mean nothing to most members."
Favouritism	"The better students are granted special privileges."
Formality	"There is a recognized right and wrong way of going about class activities."
Democracy	"Each member of the class has as much influence as any other member."

predicting learning.) Seven items describing a class compose each score; for each item the student is asked to indicate (on a 4-point scale) his agreement or disagreement on how well a statement describes his class. The mean of the seven item ratings is the individual's score, and the mean of the scores for the students in a class is the score for the class. The individual and class alpha reliabilities for the scores range from 0.6 to 0.8. Example items for most of the scores appear in Table 2.

Personality Measures and IQ

Class means on seven personality scores were used: three adapted from the work of Rokeach and others (1960) — Dogmatism, Authoritarianism, and Rigidity, and four from the Edwards *Personal Preference Schedule* (1959) — the needs for Achievement, Order, Affiliation, and Change. Items constituting the scores were reproduced in a booklet, and the students were asked to express agreement or disagreement with each on a 4-point scale. The individual alpha reliabilities of the scales range from 0.6 to 0.8.

Mean class IQ was computed from individual scores on the Henmon-Nelson Test of Mental Ability (Form B), which has a Kuder-Richardson Formula 20 reliability of .91 as reported in the *Manual*.

Biographical Inventory

Twenty items were selected from an instrument developed by Taylor and Ellison (1967) to measure creative potential. Parent forms of the instrument showed substantial correlations (.4 to .6) with assessments of creativity such as peer and supervisor ratings. The multiple-choice items relate to components of the student's home environment, school experience, and activities.

Academic Measures

Three cognitive and three noncognitive academic variables were administered both as pretests and posttests. The first cognitive measure, Science Understanding, is the total score on the *Test on Understanding Science* (Cooley & Klopfer, 1961). The *TOUS* is a 60-item, multiple-choice test on the nature of science, science as an institution, and scientists as people; its Kuder-Richardson Formula 20 reliability is .76 as reported in the *Manual*. The second cognitive measure, Science Processes, is the total score on the *Welch Science Process Inventory* (Welch & Pella, 1967); the *WSPI* is a 135-item, multiple-choice test on the assumptions, activities, products, and ethics of science and has a reported KR 20 reliability of .86. The third cognitive measure, Physics Achievement, is the total score on *Physics Achievement Test*, a locally constructed, 36-item, multiple-choice test of general physics knowledge; the *PAT* had a KR 20 reliability of .77 for physics students in the random sample.

The first noncognitive measure, Science Interest, is a subscore of the *Academic Interest Measure* (Halpern, 1965). It consists of items describing science activities, and the respondent is asked to indicate which he would like to do; the total score has a KR 20 reliability of .91. The second noncognitive measure, Physics Activities, is a report of voluntary participation in physics activities during the past year, a subtotal of the items having to do with physics on the *Pupil Activity Inventory* (Cooley & Reed, 1961); the split-half reliability with the Spearman-Brown correction is reported as .80. The third noncognitive measure is a composite of semantic differential ratings of the concept "Physics" obtained on the following scales (part of a 5-concept, 15-scale instrument): interesting/dull, exciting/boring, and stimulating/monotonous; the alpha reliability of the total of these three scales was .86 for physics students in the random sample.

Miscellaneous Variables

The class size and fraction of girls in each class were also included among the variables. Since prior work (Walberg, 1969a) showed class size to be quadratically related to group properties, both linear and squared class-size terms were entered in the factor analysis.

The fourteen *Learning Environment Inventory* scores are *prima facie* group scores (and 12 of them proved to be prominent in the factors described below). Many of the other scores (cognitive, interest, and biographical) are not intrinsically group scores, but it has been shown elsewhere that they are characteristic of groups at least to the extent that the biographical variables are predictive of classroom climate (Walberg, 1969a, 1969b), and the cognitive and interest variables are predictable from classroom climate (Walberg & Ahlgren, 1970). Furthermore, the pretests and the biographical variables are, at least potentially, available to administrators for consideration in advising students to take courses or in actually assigning them to different classes; so class means on these variables are *manipulable* and therefore are pragmatically group properties.

Testing Procedure

The teachers administered the criterion battery on two days during September and again during the following May. On the assumption that a few months are necessary for classes to mature into social groups, the *Learning Environment Inventory* was administered in November. It was assumed that IQ and personality are fairly stable, and these measures also were administered in November. The biographical items, also assumed to be stable, were administered in March.

Although all students took the *Biographical Inventory*, random halves of the students in each class took all the other instruments. This sampling method, termed "randomized data collection" (Walberg & Welch, 1967) can be used to increase the number of instruments administered in limited class time. Class sets of instruments were prepared in which different instruments were ordered randomly; a set was distributed to the class row by row, seat by seat, providing a random sample of the students in the class.

Analysis

A principal components analysis was run on the 57 variables. Components larger than 10% of the total variance were rotated orthogonally using two methods, Varimax and fixed-position. The commonly used Varimax method is designed to simplify the columns of the factor-loading matrix so that each factor has a distinctive set of high-loading variables and negligible loadings on the rest of the variables. In the fixed-position rotation method, the program is designed to rotate the factors to fit as well as possible certain variables chosen by the investigator to represent hypothesized dimensions. Thus the fixed-position rotation method permits testing of a priori theoretical structures, in contrast to automatic simple-structure rotations such as Varimax (Couch, 1969; Guilford & Hoepfner, 1969).

Table 3 lists the variable sets with which an attempt was made to elicit the three dimensions in the fixed rotation. For "status" the program was requested to place a factor through the environment variables Favouritism and (-) Democracy. (Sample items on which these variables are based were given in Table 2.) An attempt to elicit the "achievement" dimension was made by specifying the environment variables Speed and Difficulty and posttests on the cognitive academic variables Physics Achievement, Science Understanding, and Science Processes. For the "affect" factor, the environment variables Satisfaction, (-) Friction, (-) Cliqueness, and (-) Apathy were specified, as were the noncognitive academic variables Science Interest, Physics Interest, and Physics Activities. The sets of variables used to specify the achievement and affect factors have face appropriateness to those names, but the choices were based also on canonical correlations among environment and academic measures found in previous work (Walberg, 1969b).

Clearly, both Varimax and fixed methods can be useful in different research. However, since fixed-position methods are relatively unfamiliar and untested, both Varimax and fixed rotations were employed in the present study to provide two checks on the model and to provide a

TABLE 3
VARIABLES SPECIFIED TO DEFINE FACTORS IN FIXED ROTATION

Theoretical Dimension	Variables Specified
"Status"	Learning Environment Favouritism Democracy (-)
"Achievement"	Learning Environment Speed Difficulty Academic -- Posttests Science Understanding Science Processes Physics Achievement
"Affect"	Learning Environment Satisfaction Friction (-) Cliqueness (-) Apathy (-) Academic -- Posttests Science Interest Physics Activities Physics Interest

comparison between the results of the two methods. Factor analysis by its nature identifies *independent* dimensions, but cannot assure that the dimensions are interpretable and meaningful. The central intent was to find whether the Bales dimensions provide a good fit to the variables, that is, whether they account for a large and interpretable amount of common variance. The “goodness of fit” must be relative to something; principal components give the *maximum* variance-accounted-for by a given number of factors, and Varimax is the most common rotation method for generating interpretable factors. If the fixed factors meet both criteria, that is, if they are found to account for nearly as much variance as the same number of principal components and if they are as conceptually reasonable as the Varimax factors, then the Bales dimensions might be deemed a good fit to the data. In interpretation of the factor structure, factor loadings were not to be considered if they were less than .40.

Results

The principal components analysis produced eighteen factors with latent roots greater than 1. The first six latent roots for the three factor sets are plotted, in order of size, in Figure 1. The abrupt change in slope that occurs after the third root for all three sets justifies consideration of only the first three factors. (The rationale for this criterion, whimsically called the “scree” test by Cattell, is described in Cattell, 1966, p. 206.) Table 4 displays the

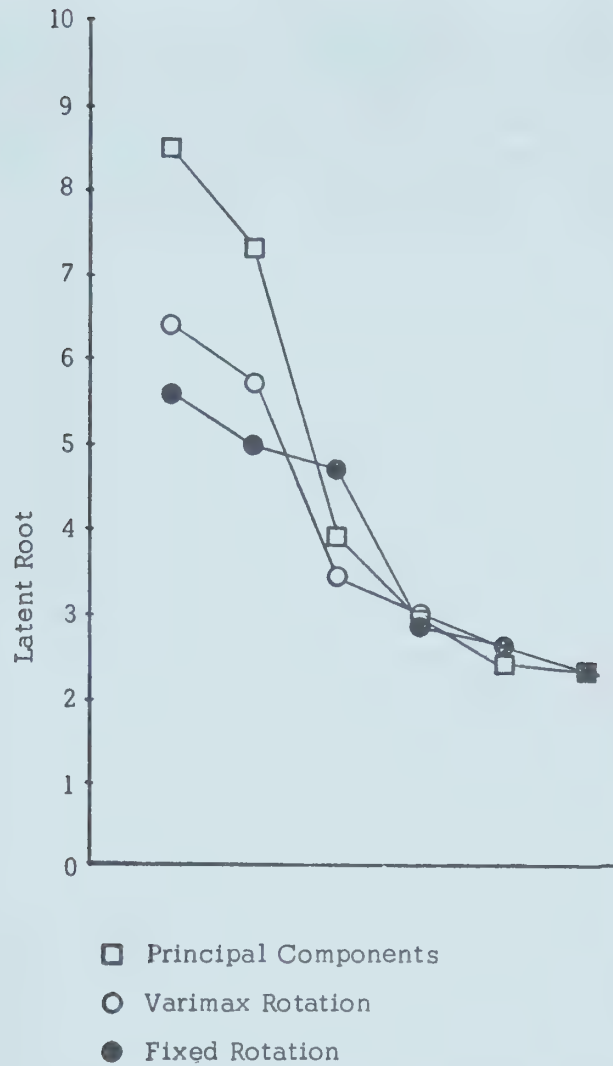


Figure 1. Largest six latent roots for three factor sets plotted in order of size.

loadings (of .40 or greater) for all 57 variables on the first three factors of each set. (The loadings on variables used to specify the three fixed factors are in italics.) Roughly equal amounts of common variance in the battery of variables are accounted for by each set of three factors, as can be seen in the bottom rows of Table 3: 45% for the three principal components, 36% for the Varimax factors, and 36% for the fixed factors. As is commonly found, there is a better balance of strength among the factors for the two rotations than for the principal components, but with slightly less variance accounted for.

All three solutions yield roughly similar factors relating to achievement, to affect, and to group structure. Because there were no data common to Bales' work and this study, it is not possible to express the match of these factors to his quantitatively. The appropriateness of the factors to the Bales model must be argued conceptually.

Discussion

The strongest factors in each of the three sets are obviously "achievement" factors and are rather similar. The second and third factors in the several sets are not so unambiguously identifiable as the first. For the

TABLE 4
LOADINGS GREATER THAN 0.40 ON THREE DIFFERENT
FACTOR SETS

Class Mean Score	Principal Components			Varimax Rotation			Fixed Rotation		
	I	II	III	I	II	III	I	II	III
Learning Environment									
Friction	-	-67	-	-	-	-75	-	-40	-66
Cliqueness	-	-62	-	-	-	-64	-	-46	-49
Satisfaction	-	76	-	-	-	80	-	42	67
Speed	-	-	-	-	-	-	58	-	-
Difficulty	43	-	-	46	-	-	75	-	-
Apathy	-	-85	-	-	-	-77	-	-53	-60
Favouritism	-	-48	-50	-	-	-73	-	-	-85
Goal Direction	-	65	-	-	-	75	-	-	55
Democracy	-	59	-	-	-	75	-	-	81
Disorganization	-	-65	-54	-	-	-82	-	-	-66
Environment	-	-	42	-	-	51	-	-	49
Personality									
Dogmatism	-46	-	-	-	-	-	-	-	-
Authoritarianism	-65	-	-	-49	-	-	-47	-	-
Need Order	-	40	-	-	-	-	-	-	-
Need Affiliation	-	50	-	-	-	-	-	-	-
IQ	75	-	-	80	-	-	63	-	-
Biographical									
Books in Home	44	-	-	-	-	-	-	-	-
Nonschool Study	-	-	-	-	54	-	-	-	-
Career Discussion	-	41	-	-	-	-	-	-	-
Like School	-	56	-	-	-	-	-	41	-
School Marks	66	-	-	57	-	-	50	-	-
Perfectionism	-	40	-	-	-	-	-	-	-
Perseverance	50	-	-	-	-	-	-	-	-
Creative Imagination	56	-	-	-	-	-	-	-	-
Scientist	51	-	-	-	59	-	-	63	-
Performing Artist	-	-	-52	-	-	-	-	-	-
Writer	42	-	-	-	-	-	-	-	-
Plan College Entrance	56	-	-	51	-	-	43	-	-
Academic -- Pretests									
Science Understanding	73	-	-	72	-	-	57	-	-
Physics Achievement	73	-	-	81	-	-	60	-	-
Science Processes	69	-	-	77	-	-	61	-	-
Science Interest	-	-	-	-	-	-	-	45	-
Physics Activities	54	-	-	-	-	-	-	45	-
Physics Interest	-	-	-	-	-	-	-	-	-
Academic -- Posttests									
Science Understanding	72	-	-	78	-	-	76	-	-
Science Processes	72	-	-	78	-	-	74	-	-
Physics Achievement	72	-	-	79	-	-	70	-	-
Science Interest	-	58	-	-	82	-	-	76	-
Physics Activities	42	40	-43	-	77	-	-	72	-
Physics Interest	-	54	-	-	81	-	-	73	-
Girl Ratio	-	49	-	-	-	-	-	-	-
Latent Roots:	8.5	7.3	3.9	6.4	3.4	5.7	5.6	4.7	5.0
% Common Variance	19%	17%	9%	15%	8%	13%	13%	11%	12%
(in 18 factors)	45%			36%			36%		

characterization of factors below, it is useful to sort the variables on the basis of face content into three rough groups: “interpersonal affect,” which includes Friction, Satisfaction, and Apathy; “group structure,” which includes Favouritism, Disorganization, Cliqueness, and Democracy; and “subject-matter interest,” which includes Physics Interest and Physics Activities.

Principal Components

The achievement factor (I) in principal components is clearly similar to Bales’ achievement dimension. It has strong loadings by both pretests and posttests for the three cognitive measures and Physics Activities, by perceived class Difficulty, by IQ, and by self-ratings of School Marks, Perseverance, Creative Imagination, Scientist, and Plan College Entrance.

There is, however, one point of inconsistency with the Bales model: the Achievement factor has strong negative loadings by Authoritarianism and Dogmatism. The negative loading by Authoritarianism is a distinctive departure from the intragroup relationship envisioned for it by Bales. Bales (1970, p. 395) reports that the factor analysis is ambiguous about authoritarianism (it is unrelated to one component of group achievement and has a weak positive relation to another), but that it ought properly to be associated positively with achievement because commitment to group goals implies acceptance of authority. This discrepancy between results of this study and Bales’ prediction may be due in part to the restricted variance and special nature of the group members in the present study — physics students with a high mean IQ. It might be, for example, that among these generally high-achievement students authoritarianism is inconsistent with understanding science. (It is interesting to note that the correlation between group means on Authoritarianism and IQ is $-.49$.)

Principal component II includes interpersonal affect variables (e.g., Friction, Apathy), and group structure variables (e.g., Democracy, Disorganization), some personality variables (e.g., Need Affiliation), some biographical variables (e.g., Like School), interest posttests (e.g., Science Interest), and Girl Ratio, and so has been labelled “General Affect.”

Principal component III shows loadings primarily by group structure variables (which it shares with principal component II), and on self-rating of Performing Artist. This combination suggests that the factor may be reflecting classes in which favouritism falling on high-status performers leads to some disruption of social structure; on the basis of this speculation, principal component III is labelled “Status Disruption.”

Varimax Rotation

As is expected in a Varimax rotation, there is a cleaner separation of the variables on the Varimax factors than there is on the principal components. The Varimax factor I is very similar to principal component I, but has lower loadings by Physics Activities and self-ratings of School Marks, Perseverance, Creative Imagination, Scientist, and Writer; so it is still labelled “Achievement.” The Varimax factor II is loaded almost exclusively by posttest subject-matter interest and activities and by self-rating of Scientist and so has been labelled “Science Interest.”

The Varimax factor III is very similar to the "Group Affect" principal component II; it is somewhat more strongly loaded both by group structure variables and by interpersonal affect variables, and lacks loadings by personality, biographical, or interest variables. It is therefore more clearly a group variable and is labelled simply "Social."

Neither the principal components Achievement, General Affect, and Status Disruption, nor the Varimax factors Achievement, Science Interest, and Social, are entirely commensurate with Bales' achievement, affect, and status dimensions. The success of the fixed rotation, however, indicates that a more satisfactory match is possible.

Fixed Factors

The hypothesized status and achievement fixed factors are clearly dominated by the variables through which the program forced them. (Achievement shows additional high loadings by pretest achievement measures, as well as by the specified posttests.) The hypothesized affect factor, however, does not have exclusive loadings by four of its six specified variables — Friction, Cliqueness, Satisfaction and Apathy; in fact, these loaded more strongly on the status factor. A neat sorting of variables is of course not necessary for a satisfactory fit, as long as the dual contribution of some variables can be interpreted sensibly.

Compared to principal component I, the fixed factor I, like Varimax I, is loaded more clearly by cognitive tests and less by interest measures. In addition, however, the fixed factor I has weaker loadings by cognitive pretests, previous grades, and IQ and has (as we intended) distinctly stronger loadings by class Speed and Difficulty. Thus the fixed factor I represents a more socialized and active dimension — what happens in the class rather than what is brought to it — and therefore seems more appropriate to a group characteristic. To suggest this socialization and activity, we label it "Group Achievement."

The fixed factor II is loaded almost as highly as the "Science Interest" Varimax factor II by subject-matter interest but in addition includes (as intended) substantial loadings by interpersonal variables such as (-) Friction, (-) Cliqueness, Satisfaction and (-) Apathy and (incidentally) a higher loading by self-rating of Scientist. Since it represents interpersonal feeling plus common interest in school and science, fixed factor II has been labelled "Cohesiveness."

The fixed factor III is similar to the "Social" Varimax factor III, but is loaded more heavily (as intended) by the variables Democracy and (-) Favouritism, and (incidentally) less heavily by the variables (-) Apathy, (-) Friction, (-) Cliqueness, Satisfaction and (-) Disorganization. For the most part, the group structure has been emphasized at the expense of the interpersonal affect, so the factor is labelled simply "Status."

Qualitatively, then, the fixed factors seem to constitute a good match to Bales' model, with the main exception being a component of subject-matter interest in the affect dimension. The deviation may well be due to additional information in the particular array of variables in this study, rather than to an intrinsic inappropriateness of the Bales model for characterizing classroom groups.

It has seemed appropriate to describe the principal components as Achievement, Group Affect, and Status Disruption, to describe the Varimax factors as Achievement, Science Interest, and Social, and to describe the fixed factors as Group Achievement, Cohesiveness, and Status. It is tempting to characterize these different organizations of the variables as three traditional views of the classroom: (a) the principal components suggest the psychologists' division of cognition, affect, and group structure, (b) Varimax rotation suggests the educators' division of achievement, motivation, and socialization; and (c) the fixed rotation suggests the social psychologists' (and, in particular, Bales') division of group progress, group feeling, and group status. This characterization is probably too glib, but it is important to remember that there need not be any "true" dimensions of group characteristics. As is often the case for science in general, different models can be abstracted with equal success from the same phenomena; the choice of model depends on one's viewpoint and intentions, and ultimately the value of a choice is judged by its fruitfulness in dealing with new phenomena.

Conclusions

Using 144 high school physics classes as units of analysis, class means on a battery of 57 variables were factored in three different factor sets — principal components, an orthogonal Varimax rotation, and an orthogonal fixed rotation based on Bales' dimensions of interpersonal interaction in groups. Each set included three main factors which could be identified roughly as achievement, affect, and group structure.

The factor set designed to match the Bales model accounts for nearly as much variance in the battery as principal components and Varimax factor sets do, indicating that fixed factors represent a legitimate way of laying out the characteristics of groups.

The fixed factors Group Achievement and Status are clearly appropriate to Bales' achievement and status dimensions; the fixed factor Cohesiveness is very similar to Bales' affect dimension, with the addition of interest in the class subject matter. It may be just this modification which will most fruitfully extend the model into the context of whole, uncontrived groups.

The unexpected negative loading for Authoritarianism on all of the achievement factors may be due to the specialized nature of the groups studied, but the speculation is offered that it may arise from inconsistency between the formal goals of a group and goals generated by intragroup interaction.

In light of the many differences between Bales' work and the present study, both in instruments and in units of analysis, the general success of the fit gives further credibility to the Bales dimensions and to their general usefulness in analysis of groups.

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Changing Negative Attitudes Toward Japanese and East Indian Canadians in Elementary School Children by Using Classical Conditioning Procedures

The purpose of the study was to test the hypothesis that positively evaluated words, when paired with emotionally ambiguous slide photographs of Japanese and East Indian Canadians, would bring about a positive change in attitudes toward these two groups. Lower mainland (British Columbia) attitudes toward Japanese Canadians are positive and attitudes toward East Indian Canadians are negative. It was anticipated, on the basis of an earlier study, that attitudes toward the Japanese Canadians would change more significantly than attitudes toward East Indian Canadians.

Pretest means of attitudes toward Japanese Canadians and East Indian Canadians showed significantly more positive attitudes toward Japanese Canadians. The East Indian slides associated with positive words resulted in significant treatment effects. There were no other treatment effects. (Dr. Kehoe is Associate Professor and Dr. Echols is Assistant Professor in the Faculty of Education at the University of British Columbia; Dr. Stone is Research Associate at the Atlantic Institute of Education, Halifax.)

The purpose of this study was to test the hypothesis that positively evaluated words, when paired with emotionally ambiguous slide photographs of Japanese and East Indian Canadians, would bring about a positive change in attitudes toward these two groups. The procedure employed is a replication of a study by Parish and Lambert (1973) in which Vietnamese and Negroes were the target groups of attitude change.

Selection of Japanese and East Indian Canadian ethnic groups was thought to parallel the situations of the groups used in Parish and Lambert's study.

Japanese Canadians have been in the lower mainland of British Columbia for quite some time and now enjoy a high degree of integration. Their "neutral position" was thought to be similar to that of the Vietnamese. East Indian Canadians have been recently experiencing difficulties in integration, and are thus suffering a more accentuated profile. This situation seemed to parallel that of the Negroes in the Parish and Lambert study.

The subjects in the Parish and Lambert (1973) investigation were from four classes with 92 Caucasian sixth-grade males and females randomly assigned to three groups. Prior to the treatments, all students were administered a revised semantic-differential rating instrument developed by Osgood, Suci, and Tannenbaum (1957). Group One was then shown 21 emotionally ambiguous slide photographs of Negroes, each one being followed by a slide photograph of a positively evaluated word and by a blank slide. They were then shown 12 emotionally ambiguous slide photographs of Vietnamese, each followed by a slide photograph of a neutrally evaluated word, and a blank. Group Two was then given a second treatment in which the word order was reversed, i.e., positive words with Vietnamese and neutral words with Negroes. Group Three was the control group. Each group was given the same pretest instrument as a posttest.

Results of analyses of covariance showed that no significant (.05) change in attitudes toward Negroes occurred in those subjects who had seen the positively evaluated words associated with the slides of Negroes. There was, however, a significant (.05) change in positive attitudes toward Vietnamese in those students who had viewed positively evaluated words associated with slide photographs of Vietnamese. Parish and Lambert suggested that the reason for this outcome was that Negroes played a more central role in the lives of the subjects than did the Vietnamese. Because of attendant emotional significance, therefore, attitudes toward Negroes are more resistant to change.

Method

Subjects

Subjects for this experiment came from an elementary school located in a middle class residential neighbourhood which is part of the greater metropolitan area of Vancouver, British Columbia. One hundred and four female and male students, with varied ethnic backgrounds, who were enrolled in grades five, six, and seven comprised the sample.

Instrument

The study utilized the same revised semantic-differential rating instrument used in the Parish and Lambert study. Only three changes were made. The word "test" was replaced by the word "survey." Likewise the words "Negroe Race" were replaced by the words "East Indians," and the words "Vietnamese Race" by the word "Japanese." The Hoyt estimate of reliability for the pretest scores was .85 and .91 respectively for the Japanese and East Indian scales.

Design and Procedure

The experiment followed a simple pretest, posttest, control group design. The students were randomly assigned to three groups: treatment one, treatment two, and a control group. All students met in one large open area classroom where the directions for the instrument were explained to them. The pretest was then administered. Treatment Group One was then sent to the library where they received the first treatment. It consisted of twenty emotionally ambiguous slide photographs of East Indian Canadians. Each was projected onto a screen for two seconds and was followed immediately by a positively evaluated word, e.g., happy, and then a blank slide. Twenty emotionally ambiguous slide photographs of Japanese were then shown for two seconds, each followed by a neutrally evaluated word and a blank slide, each for five seconds. In all cases the students read the words aloud. This group was then sent to another room where they were given the same instrument as a posttest. The control group was then sent to the library where they discussed pictures of British Columbia’s geography. They were then dismissed to the other room where they also wrote the posttest. The second treatment group then came to the library. They were shown the same twenty slides of Japanese, but with positive words. They were also shown the same East Indian Canadian slides, but with neutral words. All words were recited by the students. After the treatment they were sent to a separate room to write the posttest. Figure 1 summarizes the design.

		<u>Ethnic Group</u>	<u>Words</u>	<u>Ethnic Group</u>	<u>Words</u>	
	P					P
T1	R	East Indian	Positive	Japanese	Neutral	O
	E					S
T2	T	Japanese	Positive	East Indian	Neutral	T
	E					T
TC	S	British Columbia				E
	T	Geography				S
						T

Figure 1. Experimental design.

Although subjects were randomly assigned to treatment and control groups there was some variation in pretest means. Covariance on the pretest scores was not possible because student responses were anonymous. The “t-test” statistic for repeated measures was therefore used to analyze the differences between pretest and posttest attitude scores.

Findings

Inspection of the pretest scores in Table 1 indicates that the subjects had more positive attitudes toward Japanese Canadians than they did toward East Indian Canadians. (Lower scores indicate more positive attitudes.) In a separate analysis, the overall mean score for Japanese Canadians was calculated by adding the scores for the two treatment groups and the control group. The same procedure was employed using the mean attitude scores for East Indians. The respective grand means for the two groups are 24.46 and 32.70. The “t” value for this difference is 6.40 which is statistically significant beyond the .05 level. Table 1 shows that subjects who observed slides of Japanese with positively evaluated words showed no change in their attitudes toward Japanese. Subjects who viewed slides of East Indians

TABLE 1
T-TEST FOR PRE AND POSTTEST MEASURES OF ATTITUDES
TOWARD EAST INDIAN AND JAPANESE CANADIANS

Treat- ment	N		Pretest		Posttest ^f		t	p
			$\bar{X}$	S.D.	$\bar{X}$	S.D.		
1.	35	East Indian	32.91	8.8	28.83	8.0	2.04	>.05
		Japanese	24.06	7.1	21.53	7.5	1.46	N.S.
2.	35	East Indian	33.53	9.4	31.62	10.6	.79	N.S.
		Japanese	25.44	7.7	23.82	7.4	.88	N.S.
c.	34	East Indian	31.69	7.6	32.05	8.4	.19	N.S.
		Japanese	23.92	6.9	22.92	6.1	.65	N.S.

with positively evaluated words did have significantly more positive attitudes on the posttest. There was no significant change when neutral words were used with the same sets of slides.

Discussion

The purpose of this study was to test the hypothesis that positively evaluated words, when paired with emotionally ambiguous slide photographs of Japanese and East Indian Canadians, would cause change in attitudes. Students who viewed slides of Japanese paired with positively evaluated words showed no significant change in attitudes toward Japanese Canadians. Students who were shown slides of East Indian Canadians paired with positively evaluated words showed a significant positive change in attitudes toward East Indian Canadians.

The findings in this study are the reverse of the findings of Parish and Lambert. Their study found that the attitudes toward the less threatening group were changed significantly in a positive direction; the present study revealed that there was no change in positive attitudes towards the less threatening group, but a significant change toward the more threatening group. A possible explanation for this may be that subjects already had very positive attitudes towards Japanese as shown on the pretest. A treatment effect was not measurable because the ceiling of the scale was reached on the pretest.

If other replications show that positive word usage can have a significant effect, the implications for public education are important. More specifically in this study, the semantic differential showed that the subjects perceived East Indians to be dirty. It may be that more positive attitudes toward East Indians would result if East Indians were brought into association with the word clean. That could be done by emphasizing that cleanliness is an important value in the East Indian community. Their religion requires them to bathe twice a day. While it is understood that most classrooms would not experience intense sessions such as these, the pervasive use of positive language in classroom discourse could do much to

bring about significant positive change in attitudes towards a variety of groups.

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Sentence-Combining and Syntactic Maturity in First Year University

This study assessed the effect on the syntactic maturity of first year university students (1976, 1977) of six weeks of work with Strong's (1973) sentence-combining materials. For determining words-per-T-unit and words-per-clause ratios, the Syntactic Maturity Test by O'Donnell and Hunt (see Hunt, 1970, pp. 11-12) and a free writing exercise were pre-post instruments, the first only being used in 1976 and both in 1977. With respect to the Syntactic Maturity Test, analyses of covariance showed consistently positive results from the 1976 and the 1977 treatments, with all F ratios significant at the .001 level. On the 1977 free writing, a similar analysis showed support for the words-per-T-unit measure only, with an F ratio significant at the .05 level. In every case, the experimental groups registered improvement to levels well beyond those reported by Hunt (1970) for skilled adults. The comparatively large increments experienced by these university students on these particular measures over such a short period of time augured well for the development and testing of new curriculum materials designed to foster flexibility and maturity in young writers. (Dr. Stewart is a Professor of English Education, Curriculum and Instruction Division at the University of New Brunswick.)

Two articles in *English Journal*, February 1976, signal the current interest in the subject of this study: "Close-Up: Sentence-Combining — Back to Basics and Beyond" by Strong (pp. 56; 60-64) and "The Sentence-Combining Myth" by Marzano (pp. 57-59). Strong's piece is an enthusiastic popularization of informal sentence-combining for increased control of the syntactic resources of our language, while Marzano's presents data that would seem to undermine the positions taken by Mellon (1969) and Hunt (1970) and issues a warning against expecting too much from the sentence-combining movement.

As a matter of fact, during the last decade the whole subject of syntactic development in school children and adults has concerned a good number of English teachers and researchers. Hunt (1965, 1970) investigated the free writing of school children in grades 4, 8, and 12, and the writing of "skilled" adults who published in *The Atlantic* and *Harper's*. To eliminate the very

real problem of distinguishing between sentences and nonsentences in children's writing he introduced the "minimal terminable unit" or "T-unit" which he later defined as "one main clause plus any subordinate clause or non-clausal structure that is attached to or embedded on it" (1970, p. 4). For Hunt, this T-unit turned out to be the most significant index of syntactic maturity for school groups. Second best was clause length and third best, clauses per T-unit. Meanwhile, O'Donnell and his associates at Florida State University (1965-67) had developed a rewrite passage on an expository subject that elicited successively longer clauses and successively longer T-units from students in elementary and high school grades; it was this test paragraph that Hunt (1970) used in his study of syntactic maturity in schoolchildren and adults and that this researcher used in this study of the effect of sentence-combining practice on the writing of first-year university students.

Five curricula designed to increase sentence-embedding were examined: Bateman and Zidonis' (1966) in the ninth and tenth grades, Mellon's (1969) in the seventh grade, Miller and Ney's (1968) in the fourth grade, O'Hare's (1973) in the seventh grade, and Combs' (1975, 1976) also in the seventh grade. All reported that groups using their experimental materials showed significantly more growth than comparable control groups, and all observed no negative effects. The first two coupled definite instruction in the use of transformational-generative grammar with extensive sentence-combining practice, while the other three relied almost exclusively on a modified signal system to provide patterns for carefully structured practice and found that their "grammar-free" experimental lessons resulted in syntactic maturity increments several times the normal. Also noted was Cooper's (1973) guide for writing sentence-combining problems. Finally, in his search for new materials, the writer came upon Strong's (1973) *Sentence Combining — A Composing Book* which provided exercises that, unlike others, did not utilize a system of transformational signals or guides and which encouraged the students to experiment, to evaluate, to rewrite, and to compose on their own. Both in content and in form, this text seemed ideally suited for the freshman students he was teaching.

Two main factors prompted the present project: the current furor over the writing competencies of first-year university students, and the need to find a teaching strategy that might make for a relatively rapid increase in their syntactic capabilities. Some studies (Vitale, King, Shontz, & Huntley, 1971; Perron, 1974) had showed that short intensive exposure to sentence-combining practice accelerated growth in syntactic maturity; and, although Schmeling (1969) concluded that T-unit and clause length did not clearly differentiate between poor and good freshman papers, the ambitious review by Stotsky (1975) demonstrated quite convincingly that these could be useful measures with older groups and that sentence-combining practice did increase both the maturity and the quality of writing in elementary and high school students. It seemed reasonable, therefore, to hope that this same effect could carry over into first-year university at least. O'Hare's (1973) and Combs' (1975) encouraging research gave rise to the design and procedure chosen, while Strong's (1973) book provided the basic material for the control groups and Hunt's (1970) study a test instrument. Finally, two six-week freshman "Communications" modules, running concurrently,

presented a good opportunity for an investigation beyond the high school level.

Hypothesis, Design and Procedure

The purpose of this study was to test whether the use of the sentence-combining practice material produced by Strong (1973) would increase the normal syntactic development of first-year university Education students over the short six-week period allowed in a "Communications" module. Subjects from established class sections were randomly selected and assigned to two pairs of control and experimental groups, and the O'Donnell-Hunt (1970) Syntactic Maturity Test (see Hunt, 1970, pp. 11-12) and an analysis of free writing used to measure development in two factors of syntactic maturity. The amount of growth experienced by the experimental groups was compared with that of the control groups and, where possible, with normative data reported by Hunt (1970). The work of O'Hare (1973) and of Combs (1975, 1976) provided a basis for both design and procedure, but no attempt was made to estimate the relationship of sentence-combining practice to overall quality of writing, which both of these researchers reported was significant, and no attempt was made to estimate the relative permanence of control group gains, although Combs (1975, 1976) showed significant retention after eight weeks as measured in words per T-unit.

O'Donnell (1976) in his *Critique of Some Indices of Syntactic Maturity* concluded "It may turn out that in spite of lack of precision, T-unit length is still the most useful and useable index of syntactic development over a wide age-range and that mean clause length is the best single measure of syntactic complexity at the high school level and beyond." Since this study involved first-year university students over such a short time-span, it seemed wise, then, to use here only the two indices most generally promising to date: words per T-unit and words per clause.

Hypothesis

The study was designed to test the following hypothesis for significance at the .05 level:

The experimental groups (1976 and 1977), which were exposed to Strong's (1973) sentence-combining practice material over six-week periods, will score significantly higher on two factors of syntactic maturity than the corresponding control groups which were not exposed to the same material.

Design

With the exception of the method for the selection of subjects, the pretest-posttest control group design described by Campbell and Stanley (1968, p. 13 ff.) was utilized. It took the following form:

R O₁ X O₂

R O₃ O₄

Procedure, 1976

During a six-week period in the spring of 1976, the writer taught one module of a four-module "Communications" course to two class sections at the University of New Brunswick (Fredericton, N.B., Canada) using Strong's (1973) *Sentence Combining: A Composing Book* while his colleague S. E. Bateman taught another module of the same course to two other sections using Flanigan's (1974) *Patterns of Exposition: What, How & Why*. Average enrollment per section was 25. Each student was involved in 18 hours of in-class activity (three hours per week) and approximately 25 hours of out-of-class writing. At the beginning and the end of the six weeks, in two specially designated periods, all four class sections did the O'Donnell-Hunt Syntactic Maturity Test. There was no discussion of the project during the regular class and special testing periods, and the pre and posttests were included as part of the regular work of the modules. Finally, after the posttest periods, balanced groups were set up by selecting at random 32 students from the exposition class sections to form the control group and another 32 from the sentence-combining sections to form the experimental group. Then, for the 64 students thus selected, the pre and post "aluminum" paragraphs resulting from the O'Donnell-Hunt test were analyzed for words per T-unit (W/T) and words per clause (W/C) following procedures described by Hunt (1970, p. 4.) and O'Hare (1973, pp. 47-49).

The work done by both groups followed very closely the textual materials and guides provided by the two authors. In both cases, during the six-week period, there was coverage of the topics in the texts, and all students completed a sampling throughout the texts of at least half of the exercises provided and activities suggested. In both cases, the objectives of the two modules were discussed, initially, with the students, with the general pedagogical rationale of the two authors adhered to as far as seemed reasonable.

In the experimental group, the writer made use of the detailed guides in Strong's (1973) *Sentence Combining: A Composing Book* and the accompanying *Instructor's Manual* which included notes on the pro's and con's of sentence-combining and a number of practical teaching suggestions emphasizing individual, small-group, and whole-class exploration and evaluation of sentence-combining options arising out of the students' own syntactic competencies. Content for each composition in Phase I was provided in the form of a sequence of kernel sentences grouped to facilitate choice of interesting syntactic alternatives. Topics and sequences progressed from simple to complex. Phase II was based on the work of Francis Christensen (1967), and each lesson presented a model sentence the structure of which was followed as students worked with the blocks of kernels provided. Techniques acquired in both phases were periodically tested for usefulness in short compositions on individually-chosen topics. As far as theory and terminology are concerned, the lessons were practically "grammar-free."

Meanwhile, the control students concentrated on expository writing — selecting topics; gathering data; writing thesis statements; outlining, drafting, discussing, and revising short reports. Flanigan's text (1974) was followed as closely as possible. There was some guidance in sentence

revision, but in the traditional manner only. Grammatical terminology was avoided consistently.

Finally, it should be noted that the students in both groups were locked into the usual university time and course schedules and that there was no practical way to control their in-and-out-of-college language experiences, although all were enrolled in the first year of a four-year Education programme with required core courses designated "Introduction to Teaching" and "Communications I." It was also noted that, at the end of the academic year, the difference between the mean grade-point averages of the two groups on "Communications I" was only .05.

Summarizing, independent variables included methods and materials: sentence-combining practice and related writing versus instruction and practice in the preparation and presentation of expository reports; dependent variables were two factors of syntactic maturity: words per T-unit and words per clause. Obvious limitations related to the selection of the groups involved and the language experiences of the subjects outside the sentence-combining and report-writing modules.

Procedure, 1977

The results of the 1976 project gave rise to the decision to repeat the work in 1977 under conditions as nearly as possible identical with those of a year earlier except that (1) both control and experimental groups were taught by the writer and were balanced at 25 each; and (2) in addition to the O'Donnell-Hunt Syntactic Maturity Test's "aluminum" paragraphs, 300-word samples of free writing were elicited at pre and posttest time and also analyzed for words per T-unit and words per clause. Thirty-eight topics or "leads" were provided, and each student took one of these or one of his own choosing and expressed for other students his own opinions or concerns.

Results

Results, 1976

These are summarized in Tables 1, 2, and 3 and confirm the hypothesis that the experimental group, which worked with Strong's (1973) sentence-combining material, will score significantly higher on two factors of syntactic maturity than the control group which did not work with this material.

Pretreatment and posttreatment W/T and W/C mean scores of control and experimental groups were compared by *t* tests for two independent means assuming unequal variances. Table 1 shows that, at pretreatment time, there were no significant differences between the two groups and supports the assumption that the groups were equivalent as the result of randomization. On the other hand, the comparable values at posttreatment show that the experimental group attained a highly significant gain, at the .001 level of confidence, over the control group on both measures.

Pre and posttreatment mean change scores (posttreatment means minus pretreatment means) were then analyzed by *t* tests for correlated measures. Table 2 reveals no significant change for the control group over the six-week period involved while, for the experimental group, change was significant

TABLE 1
COMPARISON OF PRE AND POSTTREATMENT MEAN SCORES ON TWO
FACTORS OF SYNTACTIC MATURITY: CONTROL AND EXPERIMENTAL
GROUPS, SYNTACTIC MATURITY TEST, 1976.

Factor	Mean	SD	Difference	t value	df
<u>Pretreatment</u>					
W/T					
Control	12.48	2.89			
Experimental	12.82	3.70	.34	.41 (NS)	62
W/C					
Control	8.33	1.70			
Experimental	8.16	1.12	- .17	.48 (NS)	62
<u>Posttreatment</u>					
W/T					
Control	12.02	2.18			
Experimental	17.83	4.03	5.81	7.18*	62
W/C					
Control	7.94	1.47			
Experimental	10.75	2.52	2.81	5.44*	62

* Significant at or beyond the .001 level.

TABLE 2
COMPARISON OF PRE AND POSTTREATMENT MEAN CHANGE SCORES ON
TWO FACTORS OF SYNTACTIC MATURITY: CONTROL AND
EXPERIMENTAL GROUPS, SYNTACTIC MATURITY TEST, 1976

Factor	Pretest	Posttest	Change	SD	t value	df
<u>Control</u>						
W/T	12.48	12.02	-0.46	2.25	1.14 (NS)	31
W/C	8.33	7.94	-0.39	1.38	1.62 (NS)	31
<u>Experimental</u>						
W/T	12.82	17.83 (14.78) ^a	5.01	4.36	6.51*	31
W/C	8.16	10.75 (9.95) ^a	2.59	2.55	5.73*	31

^a Skilled adults, Hunt, 1970.

* Significant at or beyond the .001 level.

again at the .001 level on both factors. The experimental group’s mean pre-post change score of 5.01 words per T-unit over a six-week period at first year university compares most favourably with the gain of 6.12 words per T-unit reported by O’Hare (1973, p. 54) for his seventh graders over a much longer period of time. Also the present study’s experimental group wrote 17.83 words per T-unit and 10.75 words per clause at the end of the six-week period — considerably more than the 14.78 and 9.95 reported by Hunt (1970, p. 20) for the skilled adults he tested with the same instrument used here.

TABLE 3
ANALYSIS OF COVARIANCE OF POSTTEST WITH PRETEST SCORES:
SYNTACTIC MATURITY TEST, 1976

Source of Variance	Mean Square	Degrees of Freedom	F Ratio
W/T			
Between Groups	511.11	1	59.61*
Within Groups	332.85	61	
W/C			
Between Groups	133.67	1	35.42*
Within Groups	79.86	61	

* Significant at or beyond the .001 level.

TABLE 4
COMPARISON OF PRE AND POSTTREATMENT MEAN SCORES ON TWO
FACTORS OF SYNTACTIC MATURITY: CONTROL AND EXPERIMENTAL
GROUPS, SYNTACTIC MATURITY TEST AND FREE WRITING^a, 1977

Factor	Mean	SD	Difference	t value	df
<u>Pretreatment</u>					
W/T					
Control	11.64 (14.76)	2.40 (3.25)			
Experimental	13.37 (14.60)	3.69 (3.13)	1.73 (.16)	1.97* (.18) (NS)	48 (48)
W/C					
Control	7.65 (8.19)	1.00 (1.52)			
Experimental	8.56 (8.76)	1.54 (1.74)	.91 (.57)	2.48** (1.21) (NS)	48 (48)
<u>Posttreatment</u>					
W/T					
Control	11.95 (16.25)	2.63 (3.42)			
Experimental	16.45 (18.14)	3.80 (4.50)	4.50 (1.89)	4.85*** (1.67) (NS) ^b	48 (48)
W/C					
Control	7.80 (9.69)	1.02 (2.37)			
Experimental	11.36 (11.29)	2.83 (3.37)	3.56 (1.60)	5.90*** (1.93)*	48 (48)

^a Numbers in parentheses show free writing data.

^b Significant to the .10 level only.

* Significant at or beyond the .05 level.

** Significant at or beyond the .01 level.

*** Significant at or beyond the .001 level.

Table 3 presents the results of a simple analysis of covariance used to ensure statistical control to the end that the results described above may be attributed, within limits of error, to the treatment variable and to no other causal circumstance. Here the significance of the *F* ratio again confirms the hypothesis.

Results, 1977

Because the 1976 results were so uniformly positive and because they were based on the use of a single evaluative instrument, it seemed worthwhile to repeat the experiment in 1977, this time having the experimenter teach both experimental and control groups and adding free writing to test the consistency of the original findings.

The 1977 results are summarized in Tables 4, 5, and 6, and give qualified support to the hypothesis.

This time, with new experimental and control groups, the *t* tests compared the pre and posttreatment means for free writing as well as for the Syntactic Maturity Test, and the results were not as clear-cut as previously. The pretreatment means (Table 4) show significant W/T and W/C differences (at the .05 and .01 levels) on the Syntactic Maturity Test but not on the free writing. Randomization had apparently established equivalency on the free writing only. Also, although the posttreatment means show significant W/T and W/C differences (at the .001 level) on the Syntactic Maturity Test, the comparable differences on the free writing are not significant for W/T and at the .05 level only for W/C. The Table 4 data, then, give little support to the hypothesis.

The pre and posttreatment mean change scores in Table 5 show no significant change for the control group except on the free writing W/C measure where the significance is at the .05 level while, for the experimental group, the change scores all give *t* values significant at the .001 level. These positive indications are in contrast with some of those in Table 4. Also, this 1977 experimental group's change means (W/T and W/C) on both the Syntactic Maturity Test and the free writing compare most favourably with those for the 1976 group, and all experimental posttest scores are again higher than those reported by Hunt (1970, p. 20) for his skilled adults.

The analysis of covariance in Table 6 confirms the first hypothesis as far as the Syntactic Maturity Test results are concerned, but it leaves the free writing results in some doubt, with this measure's W/T *F* ratio significant at the .05 level only and its W/C *F* ratio below that level.

Summary

With respect to the Syntactic Maturity Test, the 1976 groups were equivalent as a result of randomization, and the experimental group experienced growth and established superiority significant in both cases at the .001 level. An analysis of covariance further confirmed the hypothesis.

As far as the Syntactic Maturity Test was concerned, the 1977 groups were not equivalent as a result of randomization, but they were with respect to the free writing samples. On both the Syntactic Maturity Test and the free writing, the experimental group experienced growth significant at the .001 level. However, it was only on the Syntactic Maturity Test that

TABLE 5
COMPARISON OF PRE AND POSTTREATMENT MEAN CHANGE SCORES ON
TWO FACTORS OF SYNTACTIC MATURITY: CONTROL AND
EXPERIMENTAL GROUPS, SYNTACTIC MATURITY TEST AND FREE
WRITING^a, 1977

Factor	Pretest	Posttest	Change	t value	df
<u>Control</u>					
W/T	11.64	11.95	.31	.56 (NS)	24
	(14.76)	(16.25)	(1.48)	1.96 (NS)	24
W/C	7.65	7.80	.15	.73 (NS)	24
	(8.19)	(9.69)	(1.49)	(3.12)*	24
<u>Experimental</u>					
W/T	13.37	16.45	3.07	4.16**	24
	(14.60)	(18.14) 14.78 ^b	(3.54)	(4.44)**	(24)
W/C	8.56	11.36	2.80	4.41**	24
	(8.76)	(11.29) 9.95 ^b	(2.53)	(3.49)**	(24)

^a Numbers in parentheses show free writing data.

^b Skilled adults, Hunt, 1970.

* Significant at or beyond the .005 level.

** Significant at or beyond the .001 level.

TABLE 6
ANALYSIS OF COVARIANCE OF POSTTEST WITH PRETEST SCORES:
SYNTACTIC MATURITY TEST AND FREE WRITING, 1977

Source of Variance	Mean Square	Degrees of Freedom	F Ratio
<u>Syntactic Maturity Test</u>			
W/T			
Between Groups	152.32	1	17.97**
Within Groups	8.47	47	
W/C			
Between Groups	127.43	1	27.83**
Within Groups	4.57	47	
<u>Free Writing</u>			
W/T			
Between Groups	49.40	1	3.74*
Within Groups	13.19	47	
W/C			
Between Groups	19.38	1	2.50 (NS)
Within Groups	7.75	47	

* Significant at the .05 level.

** Significant at or beyond the .001 level.

superiority was established at the same level. Again, as far as the Syntactic Maturity Test was concerned, an analysis of covariance supported the major hypothesis. On the free writing, however, the support was for the W/T measure only, with an F ratio significant at the .05 level.

Both in 1976 and again in 1977 the experimental group registered improvement on both the W/T and W/C measures well beyond the levels of the skilled adults in Hunt's 1970 study. The 1977 free writing mean of 18.14 words-per-T-unit for these college freshmen compares most favourably with the 14.78 level attained by Hunt's (1970) mature group.

The covariance tables emphasize the consistency of the positive results of the 1976 and 1977 treatments as measured by the Syntactic Maturity Test, with all F ratios significant at the .001 level. They also indicate the somewhat weaker case for the effect on the improvement in free writing. However, the degree of consistency from year to year is not inconsiderable when one keeps in mind the usual variability of freshman groups, the short time-span allowed, and other obvious limitations.

Conclusion and Comment

The results allow the general conclusion that the writing of the experimental groups, 1976 and 1977, was syntactically more mature than that of the control groups and syntactically more mature than that at pretest time. When compared with Hunt's (1970) norms, the level of syntactic maturity of the experimental writing exceeds that attained by mature adults as measured by W/T and W/C. Also, freshman W/T gains for the six-week period were, in each case, at least half as great as gains reported by O'Hare (1973, p. 58) for his grade seven students over an extended eight-month period and greater than those reported by Combs (1976, p. 142) for students at the same level over a four-month period. The fact that the lowest W/C gain here was 2.53 as compared with 1.49 (O'Hare) and .70 (Combs) supports the belief that clause length can be a significant measure of syntactic maturity at the upper levels. In all of this, however, it must be remembered that the 1977 groups exhibited some gain which can not be attributed to the treatment (See Table 4). Nevertheless, the overall picture is a positive one.

The 1976 results, which were based on the Syntactic Maturity Test alone, uniformly support the hypothesis. For 1977, however, the two groups presented obvious problems: at pretreatment time, randomization succeeded in equating them on the free writing but not on the Syntactic Maturity Test, and yet the analysis of covariance showed more significant differences in the Syntactic Maturity results than in those for the free writing. The consistency of Syntactic Maturity Test gains in both years is interesting, and it seems reasonable in view of the fact that the competencies required in coping with Strong's sentence-combining materials and the test itself are very similar. What contrasts there were between the two sets of data may be due, in part at least, to teacher-treatment influence: in 1976 the experimental group was taught by the researcher while the control group was taught by a colleague; in 1977, both groups were taught by the researcher. It appears, then, that variation in the 1977 procedure succeeded in producing variation in the 1977 results.

No attempt was made here to relate the syntactic maturity ratios to teachers' judgements as to "quality" of writing; but the positive findings of O'Hare (1973) and of Combs (1976) on this relationship indicate that these indices may serve as guides in this most important area at the junior high school level. Consequently, it seems reasonable to assume that the W/T and W/C increments presented in this study may indicate growth in "quality" at the freshman level as well.

Combs (1976) was first to demonstrate through delayed posttesting that W/T and W/C increments continue, at reduced levels, to distinguish significantly between control and experimental groups in studies such as this. In the present work, although nothing of the sort was attempted, the increments actually attained during a six-week period seem all the more surprising because the students involved were initially already writing at about the level of Hunt's "average" adults (1970, p. 20); it is quite likely that these effects would not erode completely and that they might even be maintained or augmented if appropriate practice were continued.

Implications

The basic purpose of this work was to test the value of Strong's sentence-combining materials in increasing the syntactic maturity of first-year university students over six-week periods in two successive years and, in general, its affirmative conclusions correspond with those of Mellon (1969), O'Hare (1973), and Combs (1976). But whereas Mellon coupled sentence-combining practice with direct transformational-generative grammar instruction, O'Hare and Combs omitted the study of grammar as such and relied solely on patterned practice. In contrast with these, Strong's *Sentence Combining: A Composing Book* (1973) gave the experimental classes in this study a great deal of opportunity for freer and more extensive experimentation: the shaping of short compositions from groups of kernel sentences provided, concentrated practice in the use of the "free modifiers" and the "cumulative sentences" so persuasively advocated by Francis Christensen (1967, 1976), and a good deal of exploration and evaluation of rhetorical options. Thus this study represented a departure from previous investigations not only in the short time-span allowed and the nature of the population included but, more importantly perhaps, in the type of sentence-combining practice and free writing they did. And, in spite of the numerous variables that bear on the results of this and other sentence-combining studies (See Combs, 1976, p. 147) and the unevenness of the 1977 results, the net effect here gives added support to the general value of sentence-combining, extends its range into first-year university, and emphasizes the usefulness of diversified practice closely related to the composing process.

This study indicated that Strong's materials were appropriate for the freshman level as they did help to make these particular classes places for mutual inquiry and active experimentation involving the varied syntactic options open to them when challenged with a series of kernel sentences on a topic of concern. In this case, transfer of attitudes and skills to other writing seemed quite natural, even inevitable.

In Chapter III of Wardhaugh and Brown's (1976) *A Survey of Applied*

Linguistics, Jean Malmstrom (pp. 50-53) traces the impact of linguistic grammar on the production of curricular materials with particular reference to sentence-combining, 1965-75, and she cites this as a promising example of a case in which "the rule of lag between research and technology did not hold" (p. 52). Unfortunately, however, the gap between the new materials and actual classroom practices remained, for, as Hook (1976) comments, "This fine material is about ready for the children but are the teachers ready for the fine material?" (p. 211). Hook was discussing a new elementary school language and composition series that contained sentence-combining materials, but his remark applies equally to teachers of older students.

In the context of the present furor over the maturity and quality of college writing, the freshman composition teacher should now be encouraged to study the claims and limitations of sentence-combining research and the contribution that it might make to his efforts. An examination of the exercises of O'Hare (1973, 1975), Cooper (1973), Strong (1973), and Perron (1974) will provide him background for constructing and trying out materials adapted to the particular needs of the students he is teaching. Most promising seems to be the movement away from formally patterned practice and towards the integration of sentence-combining activities with the whole composing process. Above all, the teacher can help his students discover for themselves the basic language competencies they already possess, and, by every means possible — including sentence-combining — help them gain confident control over the syntactic resources of their language.

O'Hare (1973, pp. 76, 77) made twelve suggestions for further research, and this writer supports these in toto. In particular, he feels that the effects, both positive and negative, of different kinds of sentence-combining practice on various types of high school and junior college writing should be investigated and that careful and balanced assessments should be made of this type of activity in different situations and with different student populations.

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Call for Papers

In its endeavour to encourage discussion among educational researchers of diverse traditions, the *AJER* invites the submission of manuscripts for our new categories, “Perspectives” and “Essay Reviews.” The perspective paper, the first of our new categories, presents through the essay format what might be termed a speculative or philosophic point of view. The paper assesses current theoretical or practical problems of educational research and considers their implications for further study. Such a paper, which at present does not easily fit existing procedures of research reporting, might center on the analysis of new directions and prospects in educational research. An examination of aims, procedures, and methods of research, including a discussion of their limitations and possibilities, might form the core of the argument; a case study could be employed to substantiate the position. It differs from the standard *AJER* manuscript submission not only in emphasis but, more importantly, in addressing and perhaps challenging fundamental questions of research. The essay by E. Miklos on “International Developments in Educational Research” is the first of our “Perspectives.”

The category of “Essay Reviews” is distinguished from the established book review format in breadth and in depth. The essay review provides a comprehensive analysis of two or more recently published studies of educational research. It should focus on an examination of the central problems presented by the authors, should select one or two for close study and comparison, and should consider their implications for the development of educational inquiry.

Authors interested in contributing to either “Perspectives” or “Essay Reviews” are invited to submit in advance an abstract of their proposal. Although the categories will not appear on a regular basis, they will supplement the *Journal’s* existing approach in reporting the results of educational research. Additional information will gladly be forwarded upon request.

In addition to encouraging submissions to “Perspectives” and “Essay Reviews”, the *AJER* continues to welcome manuscripts reporting the results of both empirical and nonempirical research. To this end, contributors are referred to the back inside cover of the present issue for a guide to the preparation of manuscripts.

Henry W. Hodysh

PERSPECTIVES

International Developments in Educational Research

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Canadian educational research is confronted by numerous problems. If research is to contribute to educational development in important ways, then these problems must be addressed by educational researchers and by those who are responsible for research policies at various levels of government. The solutions to the problems must be appropriate to the Canadian scene; they must take into account the unique factors which impinge on educational research in Canada. Solutions should not be imported from elsewhere; however, this does not mean that those involved in finding solutions to problems can afford to remain uninformed about developments in other educational settings. On the contrary, deliberate attempts should be made to determine what solutions to similar problems have been proposed or adopted in a variety of contexts.

The paragraphs which follow were stimulated by a conclusion: Canadian educational researchers have given inadequate attention to developments in educational research outside of North America. The conclusion is neither contaminated nor distorted by empirical data; it is an impression resulting from various forms of nonsystematic observation. This paper attempts to provide the basis for suggesting that educational researchers in Canada and the United States might find it worthwhile to give greater attention in future to developments on the international scene; others, Holdaway (1976) for example, have made similar suggestions on the basis of more convincing evidence. Major sections of the paper focus on the problems which attract the attention of researchers, a perspective on some developments in other countries, and the examination of three specific areas in which Canadian educational research might benefit from international exchange and dialogue.

Problems of Researchers

Whenever and wherever educational researchers gather to discuss their work, two major themes are likely to dominate. The first relates to the substance of research, to new developments in various areas, to recent

advances in research methodology and design, and to promising directions for future research. These matters are the subject of formal meetings and of the discussions which follow. The other theme relates more closely to the circumstances surrounding educational research and to the problems of researchers. Although these topics serve as the basis for formal discussions, they are more likely to be the subject of informal conversations.

The problems of educational research are numerous; the list is long and easy to construct. It includes items such as the following: educational research does not enjoy support, particularly financial support, comparable to that enjoyed by research in other fields; the educational researcher is not admired as much as is the researcher in the physical sciences or medicine; educational research is fragmented, uncoordinated and unorganized; researchers are inadequately trained for the various demands of their role; the fruits of their labours are disregarded by practitioners and policy makers; and the autonomy of the researcher is precarious. These are exaggerations; nevertheless, issues and problems of educational research funding, of the relationship of research to practice, of the status of the researcher, and of the control and coordination of research are important issues. Researchers experience such problems in their everyday lives and may be distracted from their work by them. The problems probably warrant systematic attention.

These problems are part of the Canadian research situation; however, only a few researchers have information about the extent to which they obtain elsewhere. Which of these, if any, are perceived as problems in other educational systems? How do researchers cope with the constraints imposed by the environment? What alternative models have been adopted for funding and coordinating research activities? A search for answers to these questions leads one into an examination of the literature on educational research in other countries.

International Developments

The literature on educational research at an international level has two main characteristics. The most striking feature is that there is not much of it; comparative international perspectives on educational research other than those provided by the OECD (Organization for Economic Cooperation and Development), the Council of Europe, and Unesco appear to be very limited. The second characteristic is the significant influence which a few countries appear to be having on the definition of educational research and on issues relating to the role of educational research in relation to educational development. In English-speaking countries, and to some extent in Western European countries, that influence is being exercised largely by the United States.

American Influence

Although educational research activities do have distinctive characteristics in different countries, the prescriptive literature on educational research clearly shows the evidence of the effects of practice and thought in the United States. In terms of such criteria as the extent of funding of educational research, the productivity of educational researchers,

and the influence of research on practice, the United States is frequently used as an example of the standards which other countries should strive to achieve.

Some indication of the importance of the United States literature is provided in a 1975 study by Malmquist. Although this particular study focused on the state of educational research in Europe, about 45 percent of the nearly one thousand items in the review of the literature originated in the United States. The maximum for any European country was 10 percent, about the same as that for international organizations. Even the latter may have been influenced indirectly by American sources. The items in the Malmquist literature review concerned only the nature and form of educational research and not its content. If reviews of any substantive area had been included, the dominance of researchers in the United States would no doubt have been overwhelming.

The impact of the research activity in the United States has been felt more heavily in Canada than in other countries. Although not influenced greatly by developments in structures and methods of financing, Canadians have been influenced by emphases in specific substantive areas and by ideas about the directions which future research should take. On all but a few topics, a review of literature is not complete without a review of the United States literature.

One of the examiners for the recent OECD review of educational policies in Canada, Professor Noah of Teachers College, Columbia University, observed that Canadian educational research was heavily influenced by the United States presence and example in terms of problems tackled, research strategies used, and means of disseminating results. He wondered if Canadians should take a national view of research and dissemination problems not merely for the sake of being different but because there are unique issues and opportunities for research that may be being neglected (OECD, 1976, p. 186). Most Canadian researchers would agree with this perceptive observation with respect to both what is and what should be. Educational research in Canada is different from that in the United States to some extent, but not much different.

Educational Research in Europe

There are numerous hazards in attempting to generalize about the state of educational research in other countries. One reason for this has to do with the limited current information which is readily available; the other relates to the varying definitions of educational research and to the various types of structures for carrying out these activities. A recent OECD (1974) report classifies countries according to the stage of development of educational research; the stages are labelled simply Stage I and Stage II.

Educational research and development in Stage I is characterized by what might be termed "free" research. Problems are identified by the researcher, and research is conducted for the purpose of producing knowledge through scholarly enquiry in order to develop a discipline. Any effect which the research has on practice or on educational policies is indirect; that is, research contributes to building a store of knowledge which is available to those who may wish to relate it to practice. There are no

direct links between researchers and policy makers. The typical research center consists of a university chair and the associated research institute. The centers are small with a high proportion of part-time staff. A significant proportion of the research is conducted by doctoral students who have limited access to resources other than their time and energy.

Research which is conducted tends to be single-discipline research. The studies focus on nonempirical, theoretical and apolitical problems; there is heavy reliance on documentary sources and relatively straightforward data-gathering. Emphasis is placed on philosophical, historical, and comparative studies; socio-psychological problems are likely to be investigated by those who have a more empirical orientation. In this stage of research, the usual development strategy involves pilot schools in which innovations are tested before they are implemented throughout the system. In some countries certain schools are designated permanently as experimental schools. Of course, at times there may be implementation of innovations without any try-out.

By contrast, educational research and development in Stage II has quite different characteristics. The purpose of research is to produce knowledge which can be used to make decisions; that is, research is client- or user-oriented. There is more direct communication between researchers and policy makers, and research activities may be related to development plans. As a result, research problems are determined by clients either through consultation with researchers, commissioned research, or other means.

In Stage II, the research and development organizations vary from university-based institutes and autonomous centers to ministry-related research and development units. These organizations tend to be larger and more numerous than in Stage I, and there are direct or indirect means for coordinating research efforts. Researchers have access to more resources, are more highly trained and have higher prestige. There is greater probability of multidisciplinary research which includes empirical studies of learning processes, of teaching methods and materials, and of school organization. Innovations are tried out on a comprehensive basis in selected regular schools and gradually extended to all schools in the system.

According to the OECD analysts, a number of European countries — in particular France, Italy and Spain — are still in Stage I. Those which seem to be well into Stage II include Sweden, Norway, Finland, the Netherlands, and England. A number of countries — such as Federal Republic of Germany — are in varying degrees of transition from the first to the second stage. There are some indications that the USSR and some other socialist countries could be added to the list of those in transition. Although much research activity would still be similar to that of the first stage in these countries, information provided by Birzea (1973) suggests that there is a shift to a more policy-oriented, comprehensive approach to educational research and development.

Although accurate comparative descriptions are not available, most of the developing countries of Asia, Africa, and Latin America are probably in the early phases of Stage I; however, it is likely that the transition to Stage II could be made without awaiting the further development of Stage I. Both fundamental research and the applied or decision-oriented research could be

developed simultaneously. An illustration of this type of development may be India which has many of the characteristics of Stage I but where there is also an awareness of the need to develop complementary research activities (see, for example, Buch, 1974).

In general, a more useful conceptualization of Stage II might be to consider that it includes everything of Stage I with the addition of new purposes and institutional arrangements. The development of educational research could then be considered in terms of the elements added rather than the extent to which previous activities have been supplanted.

Coordination of Research

The European countries may also be categorized on the basis of whether they take a centralized or a decentralized approach to the coordination of educational research. Included among the countries which attempt to coordinate educational research directly through centralized mechanisms are Sweden, Finland, Denmark, France, Portugal, Hungary, and the USSR; those which have adopted decentralized or indirect forms of coordination include Norway, England, Germany, and Yugoslavia (OECD, 1974). Clearly there is no necessary relationship between the stage of research development and whether a centralized or decentralized approach is adopted for planning and coordinating educational research activities. There will, of course, also be variations within these two broad categories of either a centralized or decentralized approach.

Basically, where centralized planning and coordination exist, the research problems or programs are defined by an agency closely associated with the Ministry of Education, and these themes are communicated to research centers and individual researchers. Research projects are approved centrally, and funding is largely from public sources. Two countries which have adopted quite different forms of the centralized approach are Hungary and Sweden.

According to a recent report (Agoston, 1977), Hungary has a long-term research plan which encompasses educational research. Coordination is achieved through a central committee at the ministerial level. The committee selects research units or individuals for specific research projects, recommends funding to the Minister, receives progress reports, and evaluates interim and final results. These centrally coordinated projects may not include the whole of research activity. As Agoston (1977) stated:

Any research institution, any department of education may do research outside this central plan, and the financial resources required for this purpose by the university or college institutes or departments must also be secured. In principle, these research establishments are at liberty to decide whether or not they want to accept a research assignment under the plan. (p. 14)

He then added: "Of course, if they decline, they will receive no funds from the budget of the Interministerial Coordinating Committee" (p. 14). This particular research director reported that he had obtained substantial funding for participating in three national-level research projects.

Sweden has adopted a policy of central planning and coordination coupled with the concept of mobile funds. Research funds are allocated to projects rather than to institutions or to the appointment of full-time

researchers (Marklund, 1977). The funding of research in Sweden is relatively high, and the achievements of research are regarded favourably by outside observers.

In Sweden, educational research and development policy is defined by a special bureau for educational research and development within the National Board of Education and the Office of Chancellor of Universities. As Marklund (1977) has stated:

The major question in planning and coordination of educational research and development activities at the national level is how to allocate available earmarked resources. (p. 24)

An illustration of the result of this planning in Sweden is provided by the distribution of funds for different types of research in 1976-77:

- 9% — basic research
- 70% — policy-oriented research and development at the preschool, school, adult education and teacher training levels
- 21% — policy-oriented research in higher education

The 70 percent allocated to policy-oriented research at other than the higher education level was broken down further as follows: preschool, 5%; compulsory, 12%; post-compulsory, 12%; adult, 13%; general educational problems, 15%; and, planning and information, 7%. Research priorities are determined cooperatively by researchers and policy makers.

The centralized, coordinated approach will find particular favour with those who prefer highly rationalized structures and procedures. Other countries would serve as models for those who prefer more decentralized and less direct forms of coordination. Two which will be described briefly are the United Kingdom (England, Wales, Scotland, and Northern Ireland) and Norway.

In the United Kingdom, coordination of educational research and development is decentralized to some extent. Then within that decentralization, the preference for informal understandings as opposed to formal agreements and mechanisms is as evident in educational research as it is in other endeavours. An OECD (1974) report described the bodies which promote research in different sectors of England and Wales as follows:

Fundamental research carried out in universities is financed essentially by the University Grants Committee and, to a lesser extent, by the Social Science Research Council; the Schools Council commissions most of the projects dealing with programmes and evaluation; the National Council for Educational Technology is responsible for research carried out in this particular field. A substantial part of the activities of the NFER (National Foundation for Educational Research) is devoted to research and development. (p. 46)

The report states that "there is a wealth of interconnections between them but no formal coordinating mechanisms" (p. 46). These interconnections are achieved, in part, by having governing boards which include representatives of the Department of Education and Science, the research and development community, teachers and local education authorities.

The situation in Norway is similar and appears to be the result of a deliberate policy to diversify and pluralize support of educational research as was suggested by the OECD (1974) report. The purpose of the various sources is to have different value structures giving direction and support to

different types of educational research. It is assumed that the universities will tend to support fundamental research and that the Ministry of Education will favour applied research and development, but far from doing so exclusively. Sources of funding, therefore, include regular university appropriations, the Research Council for Science and Humanities, the State Council for Experiments in Education, and special funds within the budget of the Ministry. The report states:

. . . no formal boundaries are drawn up between the field of operation of the various financial bodies, and practical coordination is ensured by considerable overlap of individuals participating. No attempt is made to ensure consistency, as different value structures are permitted to operate simultaneously. A researcher turned down by one agency because of its particular criteria of selection may be accepted by another operating on different criteria. (p. 46)

The policy which gives this freedom to research is extended even to the research agency. For example, the research staff of the Institute for Educational Research at the University of Oslo have half-time for research work. The projects are not run by the Institute but by the staff members who personally apply for grants from research funds or do research on commission (Carelli & Sachsenmeier, 1977, p. 134).

Clearly, the centrally directed, formally coordinated and the decentralized, informally coordinated approaches represent two alternative models for organizing educational research. Each appears to be satisfactory to at least some of the parties involved, and the prerequisites for effectiveness, if any, could be determined. Models such as these could be applied at either the national or the state and provincial levels.

Substantive Research Areas

The substantive areas of research in different countries are determined by various factors such as academic traditions; political or social pressures which either prevent or encourage particular kinds of studies; awareness of social, economic and political factors affecting education; as well as availability of funding for research in particular areas (OECD, 1974, p. 43). Some of these emphases have already been alluded to in previous mention of the stages of research.

Although a broad range of problems is pursued within any country, there do appear to be some general trends such as the following:

1. projects in psychology and sociology relevant to education represent a large part of European research;
2. history of education, philosophy of education and comparative education are still important areas of research in France, Germany and Italy; and,
3. in the Netherlands, the United Kingdom and the Scandinavian countries research frequently focuses on school curricula, evaluation and learning processes in schools.

In some instances, research emphases are related to proposed or current reforms in education, particularly in the Northern European countries more so than in the Southern ones.

Research in the Eastern European countries seems to span the full range from traditional academic and socio-psychological research to developmental projects closely associated with educational changes. Among

the research projects mentioned in recent literature (Carelli & Sachsenmeier, 1977) are compensatory preschool education in Hungary, lifelong education in Poland, and curricula for polytechnical education in the German Democratic Republic.

The director of one research institute in the USSR (Kashin, 1977) described a recent research thrust as follows:

Theoretical and practical elucidation of problems concerning the content of education in schools has been entrusted to our Research Institute for the Content and Methods of Education, which forms part of the USSR Academy of Educational Sciences. At present 263 research workers and staff of our Institute (not counting ancillary staff) are engaged on curricular improvement of all subjects in accordance with scientific principles. Scientific laboratories headed by the greatest methods specialists in the country have been set up for each subject. In addition, the Institute has several laboratories to study particular problems, such as the level of the pupils' knowledge, arts education, education in the natural and mathematical sciences, optional courses, etc. (p. 54)

He indicated that future direction of research would focus on methods:

. . . the main efforts of our Institute over the next five years will be directed towards the theoretical elucidation of the problem of teaching methods and their application in accordance with the requirements of life. We realize that this is far from being a simple problem. (p. 62)

The director did not elaborate on the exact definition of teaching methods nor on the direction which the research is likely to take. The research thrust does reflect the attention being given to teaching methods by the Academy of Pedagogical Sciences which addressed the improvement and modernization of teaching methods at its general meeting in December of 1976 (*Innovation*, 1977, p. 2).

Trends

The sources to which reference has been made in this paper suggest that educational research in Europe is in varying stages of transition from the traditional academic research emphasis to the more applied, developmental types of research activities. This transition does not always proceed smoothly and calmly. Malmquist (1975, p. 59) has pointed out that there is some concern on the part of researchers in the Federal Republic of Germany about the shift from the free research model to that in which research serves policy makers. In spite of these and other concerns, there do appear to be moves in Europe toward:

- increased emphasis on applied educational research;
- closer links between researchers and practitioners both at the operational and the policy making levels;
- involvement of a broader range of talent in educational research including teachers and graduate students;
- acceptance of some form of coordination of educational research;
- focus on problems which are closely linked to educational development plans.

These changes prompt a number of questions about the future of educational research. First, what impact will cooperation between researcher and client have on the nature of educational research? In particular, what will be the effect on basic or fundamental research?

Second, will certain forms of coordination prove to be superior to others? Third, will researchers be able to produce the types of results that will continue to be satisfying to both the client and researcher? These types of problems and possibilities suggest that the developments in the European countries and elsewhere should be monitored over time.

Some Persistent Problems

A review of trends in educational research in other countries reveals the diversity of approaches that can be taken to solving specific problems or to working towards particular objectives. Clearly, there are no simple solutions to problems of funding, to improving the status of educational research, to changing interactions between researchers and clients, or to coordinating educational research activities. The review does suggest some alternative models and strategies that might be considered in relation to various problems.

If educational research in Canada is to make significant contributions to educational improvement, the search for alternative solutions to persistent problems must be continued. Of the various problem areas, three to which renewed attention could be given are: (1) the relationship between researcher and practising educator; (2) the degree of specialization in educational research; and (3) the preparation and continuing education of researchers. These are three aspects in which the present state of educational research in Canada is not entirely consistent with the characteristics of Stage II educational research. As Holdaway (1976, p. 15) suggested, approaches to solving similar problems elsewhere may suggest alternatives that merit serious consideration.

Relating Research to Practice

The record of the impact of educational research on practice is not particularly impressive, either in North America or elsewhere. Dramatic changes in education have seldom (never?) resulted solely from research activities. Educational research has made its contribution, but that contribution has been made gradually and subtly. Whether or not there could be more productive associations between researchers and clients than now exist in Canada has not really been tested. Although in recent years some organizational arrangements have been developed to facilitate communication between researcher and practitioner, both parties have been cautious about the relationship and have tried to ensure that proper distance be maintained.

Many educational researchers prefer to work in the relative comfort of the university or similar organization which provides security and protection. Researchers would like to have access to generous levels of funding for projects which they are free to choose. Researchers might like to influence practices in schools or educational policies but are not anxious to have their research efforts directed by some outside agency. Research results are marketed through publications and conferences; often researchers are disappointed that their products find no buyers or may be startled, when they do receive attention, by the implications which consumers draw from research results. For the most part, Canadian educational researchers operate within a relatively closed system and

seldom engage in dialogue either with those who fund research or those who use the results of research.

For their part, many practitioners and policy makers appear content to carry out their activities without being well informed about the contributions that research might be able to make. Policy makers are reluctant to reveal policy changes which they are considering or to enlist the aid of researchers in assessing alternatives and in conducting some advance studies. Too many changes are decided on the basis of political appeal, frequently without a concerted effort to determine their educational merits or practicability. Curricular changes, policies on school buildings, examination practices, and the content of teacher education may all be affected by hastily conceived policy decisions. Sometimes the policy maker will enlist the researcher through commissioned research or requests for proposals which are announced on short notice and which may have unrealistic time or budget limits. The researcher is placed in a “take it or leave it” position. Such ventures may serve only to reduce the probability of expanded future collaboration.

Initiatives to remedy the situation could, and probably should, come from both sides. The community of educational researchers could undertake to inform those who make educational policy or who advise on educational policy what linkages might be developed as part of an overall research policy. The policy advisors could take the initiative to inform themselves about the contributions which educational research can make and the alternative structures through which those contributions could be made.

In addition to these general discussions, more researchers could concern themselves with the issues and problems that have direct implications for the fields of policy and practice. The initiatives of individual researchers might do much to create more favourable working relationships between the producers and the consumers of research. An illustration of what might be done is provided by Yates (1977) in the context of some research projects carried out in England:

What I am advocating is that we should explore the possibilities of carrying out research projects not on behalf of administrators and teachers but rather in cooperation with them. Instead of the consumers being required first of all to put forward questions for research and then pay heed to the results that it yields but leaving the conduct of the research in the meantime to the professional researchers, what is envisaged is a partnership that persists throughout the exercise. (p. 44)

According to the report of the Director, the experience of the National Foundation for Educational Research in England and Wales of involving teaching staff in conducting a number of research projects apparently has been quite successful. This action research approach has demonstrated that the technical skills required for designing specific research projects can be provided by a small core of researchers while the actual conduct of the project is in the hands of the teachers themselves. A collaborative approach reduces problems of dissemination of research results.

The search for functional and effective linking mechanisms between educational researchers and the users of research merits continued attention. Rather than merely trying to communicate more effectively with

practitioners, researchers should also be prepared to consider different types of relationships.

Specialization in Research

Two of the characteristics of Stage II educational research and development are (1) improved training of researchers, and (2) a greater probability of multidisciplinary research. The question arises as to whether the two are compatible. Increased training of researchers probably leads to higher degrees of specialization in narrowly-defined areas. Discovering increasing numbers of problems to research within those areas is likely to lead to decreased communication and interaction with researchers in other areas of specialization. Decreased communication will decrease the probability of multidisciplinary research. If this is indeed the case, then one of the characteristics of Stage II research and development may be difficult to achieve without special effort.

The effects, both positive and negative, of high degrees of specialization in educational research are relatively easy to observe in Canada and the United States. On the one hand, there have been notable achievements within the various areas of specialization; this has contributed to the international recognition of researchers in North America. We see also the negative consequence: specialized journals which are read only by selected researchers; interest groups which attract only people with like interests; and production of research results which find increasingly less direct application in the educator's world.

In order to counteract the dysfunctional consequence of specialization, special efforts should be made to ensure that there is research of an inter- or multidisciplinary nature. In North America, this means first of all crossing some of the disciplinary boundaries within educational research in relation to major research and development projects. Thus, to take an obvious example, an interdisciplinary curriculum project should include not just curriculum experts but also educational psychologists, educational sociologists, and educational administrators. Such collaboration has the potential of resulting in a better definition of the problem and in outcomes which are more likely to be applicable in schools. From time to time researchers need to remind themselves that problems encountered by practitioners do not lend themselves to neat divisions according to the boundaries which have been established within the field of educational research.

Even if the dysfunctional effects of disciplinary boundaries can be reduced, the problem of linking educational research and development to other areas of study still exists. Not only have sub-specializations within educational research become insulated from each other, but educational research has also become isolated from other institutional areas. The possible merits of interdisciplinary studies is brought to attention by an example in a different social and cultural setting. As Wrocynski (1977) stated:

Being a socialist country, Poland attaches considerable importance to interdisciplinary studies in education because the development of education and schooling is closely linked with the pace of development in all fields of our socialist culture and economy. We are currently implementing an ambitious

program of educational reform aimed at making secondary school universal. These changes determine the direction of interdisciplinary studies . . . (p. 30)

Two other areas in which interdisciplinary studies have been carried out include forecasting the development of the educational system and lifelong education.

An illustration of the general approach taken to interdisciplinary studies in Poland is outlined by Wrocynski (1977) in relation to a symposium on lifelong education:

The above-mentioned problems requiring the cooperation of educationists with representatives of other sciences in particular with psychologists, physiologists and anthropologists, are fundamental for the design of a system of life long education. An educational reform cannot limit itself to organizational matters.

Wrocynski described the groups represented at the symposium:

. . . representatives of different sciences, directors of educational institutes and heads of enterprises, who discussed the implications of lifelong education for schools. The problems were discussed from the points of view of: aims of education, content of education, teaching methods, the biological and psychological development of a child, development of mental creativity, vocational training and the role of the place of work. . . Our experience allows us to draw conclusions regarding the methodology of further complex studies involving cooperation with practitioners and their role in the verification of theoretical opinions. (p. 35)

Of course, the symposium was not that unique, and there is no information on the extent to which subsequent research was of an interdisciplinary nature. Nevertheless, the intent is clear and may have had a different outcome from one in which a group of educational researchers sets out with the intention of solving a problem or developing a plan without input from researchers in other fields.

The point of this discussion is not whether specialization is necessary or desirable but rather about our apparent inability to take steps to offset some of the dysfunctional aspects of high degrees of specialization. Educational research may be too fragmented and too insular. Consideration should be given to increasing the interaction among educational researchers as well as with researchers in other fields.

Improving the Researcher

Analyses of the state of educational research and development usually lead to prescriptions for improving the quantity, the quality, or practical relevance of that activity. Although these prescriptions may touch on all facets of research, they have one striking feature in that they all seem to emphasize organizational, managerial or technical changes which would improve research. Only passing mention is made of the researcher, of his values and outlook, and of his ability to be self-directing rather than directed by the organizational framework which surrounds him with constraints.

Proposals for the improvement of research and development which focus on the need for national policies, for increased funding, for new structures, and for different linkages do, of course, identify highly important factors; however, these factors form only the environment of research activities. At

best they can have only an indirect effect on the quality and quantity of research produced; these will be determined much more directly by the persons who actually conduct the research. Regrettably, little attention is given as to how researchers might be helped to improve regardless of the organizational structures within which they may find themselves.

Too little attention seems to be given, in proposals for improving research, to the initial training and further education of researchers; furthermore, training may be inappropriately defined. The Malmquist study (1975, p. 241) of educational research in Europe found that the expressed need for further training was concentrated in areas related to the processing of data, such as statistics, research methods, mathematics, and computer science; that is, further training needs were identified as technical training needs. No mention is made by Malmquist of preparing researchers to make decisions about selection of research problems, establishing research priorities, or assessing the practical significance of research results.

There is evidence that some researchers, at least, need assistance with selection of research problems. For example, Buch (1974) reported that in India, research and development of testing instruments attracted more attention than did the problem of causes of failure in school. As he stated:

A large number of studies have been undertaken in the area of educational evaluation and examinations. A good deal of research has been devoted to constructing standardized achievement tests. A few research projects have studied the psychometric properties of examinations. But the periodic analyses of examinations conducted by the State Boards of Education reveal the ghastly fact of more than fifty percent of the students failing in public examinations. Even this has not evoked studies which may throw light on this state of affairs. (p. 23)

The apparent misdirection of research efforts is not unique to India or other developing countries. We have examples much closer to home of where educational researchers have for too long neglected educational problems which were not defined as problems for research.

One solution to the problem of directing the researchers' attention to the "right" topics is to impose controls; that is, to set priorities externally or to provide incentives through funding. An alternative might be to rely more on self-direction on the part of the researcher by including problem identification — not just problem definition and delimitation — into preparation and continuing education programs. In most fields of study there appears to be no continuing process which would evaluate the importance of the problems being studied. Reviews of research tend to focus more on compilation of summaries, on comparisons, and on technical quality of the research rather than on directions which research might take.

Another aspect of preparation that merits attention is suggested by some data reported by Malmquist (1975, pp. 121-122). When members of a committee were asked to judge research proposals for funded projects, a definite geographical bias was observed: 84 percent of proposals emanating from the home cities of committee members were judged acceptable, while only 33 percent of proposals submitted by researchers in other cities were judged acceptable. This leads Malmquist to wonder about the capability of scientists to apply "the same standards of objectivity and rationality in the judgement of their own affairs as in their research work" (p. 121).

Perhaps this will suffice to support the suggestion that preparation of researchers must be broader than training in the acquisition of technical research skills. Initial and continuing education should include topics such as the goals of educational research and development, the philosophy of science, the role of the scientist in society and the impact of personal values. Of course, to propose that such education would compensate for the inadequacies of organizational arrangements and insufficient funding would be foolish, but then so is assuming that structural changes alone will remedy deficiencies in educational research.

Conclusion

The brief glimpses into the state of educational research in other countries which were presented in various parts of this paper provide some support for the suggestion that educational researchers should become much more familiar with developments elsewhere than they tend to be. Researchers are well aware of the need to monitor at the international level the progress of research in substantive areas; however, this interest needs to be extended to the conduct of educational research in general. Of value would be more information about the insights into the varying definitions of educational research, the role of educational researchers, the linkages between educational research and policy, and related matters.

Perspectives on these developments are difficult to obtain from the literature. Reports by those who have visited other countries are an improvement; reports by those who actually work in those other environments would be even better. Educational research associations in Canada and the United States could facilitate the exchange of information by regularly inviting researchers from other countries to discuss with us the state of educational research in their educational system. For example, it would be informative and helpful to know how educational researchers cope with the constraints imposed by a central plan, how they respond to the demands under a policy of mobile funds, and with the way in which the activities of research institutes are linked to educational reforms. It would be all too easy to adopt the view that others are "trying to catch up" and that nothing is to be learned from them; this would be an erroneous and unproductive perspective. There appears to be a high degree of similarity in the problems which confront educational research in different countries; the solutions differ. Researchers and those who make policy about educational research might be well-advised to learn more about these solutions.

This paper is based on notes prepared for a presentation to the Annual Meeting of the American Educational Research Association in Toronto on March 30, 1978. The helpful comments of E.A. Holdaway on an earlier draft are gratefully acknowledged.

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BOOK REVIEWS

THINKING WITH THE TEACHABLE MACHINE. *By John S. Andreae.* London, England: Academic Press Inc., 1977, 178 pp., \$15.25. (ISBN 0-12-050050-1)

In the prologue of this book the author states, "Fifteen years of research with the one aim of designing a system which can learn anything 'from scratch' has taken me from simple ideas to simpler ones." The result of these efforts is PURR-PUSS, about which Andreae rhapsodizes, "PURR-PUSS . . . has been found capable of choice, of original actions, of counting, of substitution and recursion, of setting her own goals and of having them set for her. PURR-PUSS can be taught in any language, can be given any size of memory and can interact with the real world. She has no known fundamental limitation. She becomes her experience."

This passage will astound Artificial Intelligence (AI) researchers. Has Andreae actually managed to realize that simplistic dream of the fifties, the automaton which evolves toward sapience through "self-organization" alone? Were researchers too hasty in accepting the view that a computer cannot be programmed to *acquire* a cognitive skill until the computational mechanisms required for that skill are clearly understood? As it turns out, there is no need to recant that very sensible view. Orthodox AI researchers may safely return to their study of specific mechanisms for solving problems, proving theorems, understanding language, manipulating blocks, and so forth. Andreae offers neither experimental nor theoretical evidence that PURR-PUSS will ever perform intellectually nontrivial tasks. With PURR-PUSS, as of yore with the Homeostat and Perceptron, optimistic extrapolations require a prodigious inductive leap: if PURR-PUSS can learn simple tasks from scratch then she(!) can learn anything from scratch.

What is PURR-PUSS? It is essentially a sequence-extrapolation program which bases its predictions and actions on recurrent subsequences of symbols. For example, PURR-PUSS would predict the pair of symbols P4 A4 after seeing the sequence

P1 A1 P2 A2 P3 A3 P4 A4 P1 A1 P2 A2 P3 A3 . . .

because the triple of pairs P1 A1 P2 A2 P3 A3 was previously followed by P4 A4. There are actually five such predictors working concurrently. The first, called main-PUSS, operates as just illustrated. Of the others, pattern-PUSS is responsive to patterns only (i.e., the P_i), action-PUSS to actions only (i.e., the A_i), physical-PUSS to action-pattern pairs in which the action is

syntactically marked as “physical,” and speech-PUSS to actions syntactically marked as “speech.” Each watches for recurrent n-tuples ($n = 3, 4$, or 5 , depending on the PUSS) of the events to which it is responsive so as to predict the next such event. All patterns are supplied by “Teacher.” Actions are supplied by PURR-PUSS or by Teacher at PURR-PUSS’s discretion.

PURR-PUSS’s basic decision strategy is to generate action sequences which previously led to an unexpected pattern. In that sense, it is “novelty-seeking.” (However, it should be kept in mind that a “pattern” is an unanalyzed character string and that “expectations” are based on recurrent n-tuples). For example, when the sequence

P1 A1 P2 A2 P3 A3 P4 A4 P1 A1 P2 A2 P3 A3 P4 . . .

has been seen, pattern-PUSS anticipates P1 as the pattern following the next action. Since P1 was not previously predicted as a successor to patterns P1 P2 P3 P4, PURR-PUSS regards it as “novel” and so seeks out this “novelty” by choosing action A4, which previously led to P1. Similarly longer paths toward “novel” patterns can be followed, by chaining forward pattern-PUSS predictions. There are some further features and refinements. For example, actions are priority-ranked depending on whether or not a path to a novel event is being followed, and which of the secondary PUSSes concur with the prediction of main-PUSS. Equal-priority choices are made randomly. Also Teacher can signal disapproval of an action, to inhibit future selection of that action as a successor to the preceding n-tuple.

This sums up chapters 1-4, which also include many implementation details, illustrative examples and anecdotes. Evidently Andreae wants the book to be comprehensible and appealing to non-computer scientists, among whom he perhaps expects to find a more receptive readership. For example, he devotes several pages to explaining well-known methods of hash-coding n-tuples of symbols. (Incomprehensibly, he equates triply redundant hash-coding with holographic storage.) In another section, Andreae recounts how he found a periodicity in an electronic coin-tossing machine by compiling conditional event tables with the aid of PUSS. Though the tale is entertaining, it turns out that Andreae, not PUSS, discovered that every third toss duplicates its predecessor. Indeed, though Andreae makes no mention of the fact, PUSS is *inherently* incapable of discovering this regularity.

This illustrates a fundamental weakness in Andreae’s prediction scheme: its inability to *generalize* over sequences and their relationships, i.e., its inability to form concepts. Its learning is of a trivial sort, incapable of coping even with simple statistical trends, let alone regularities requiring nonfinite-state computations (e.g., 1011011101111011110 . . .). PURR-PUSS superficially resembles a “production system” à la Newell & Simon (*Human Problem Solving*, Prentice-Hall, 1972), but completely lacks the usual flexibility of production format and function.

In chapters 5-7, PURR-PUSS is taught such tasks as “counting” (setting a register bit to 1 for each bead encountered on an imaginary 3-bead, 5-place abacus), saying HELLO MISTER so-and-so HOW DO YOU DO in response to any one of 3 “face” descriptions (e.g., the description of MISTER TRIANGLE FACE: <FACING> [BOTMLEFT <WEDGE> [UPACROSS <HAT> [DNACROSS <WEDGE>), and following fixed routes in a discrete maze of 16 adjoining squares. Each teaching session consists of several hundred pattern-action pairs. Some of the pattern-action

subsequences are “speech.” To the extent that “speech” consists of recurrent n-tuples of words, PURR-PUSS can recognize and duplicate previously encountered phrases, and use them to trigger other expectations and actions. After detailing his teaching of the maze task, Andreae remarks “. . . we have seen that PURR-PUSS can set her own goals in a simple way.” By this he means that in the middle of an action sequence prompted by a verbal request, PURR-PUSS sometimes veers off and does something else. The reason is, of course, that the action sequence may contain an n-tuple which was part of *another* action sequence taught earlier. This phenomenon might less kindly be described as *confusing* two goals. Andreae also mentions an earlier hardware device CAESAR but remarks enigmatically that “the behaviour of CAESAR when driven by PURR-PUSS was difficult to describe with the printed word” (Perhaps unprintable expletives are required?). About a more recent device ESAW, which uses a suction cup to move about chips on an array of photocells, Andreae says only that “ESAW is proving a rich environment for PURR-PUSS” and refers to an internal report for further information.

In the Appendix, Andreae proposes a brain model called Mew-Brain which is based on a formal-neuron realization of the basic PUSS sequence-prediction mechanism.

Of what value is this book and to whom? Its value to AI is negligible. In fact, its apparent relevance to that field is largely an illusion fostered by Andreae’s use of AI buzz-words such as “multiple context,” “chunking of information,” “hypothesis formation,” “resolving ambiguity” — and for that matter, “pattern,” “language,” and “intelligence” — in trivialized senses. In one of several preemptive strikes against his critics, Andreae declares that intelligence, like beauty, is in the eye of the beholder. Perhaps so, but this beholder sees no glimmer of it in PURR-PUSS. Non-computer scientists may find the book a pleasant diversion. They are urged, however, to balance their reading with Bertram Raphael’s excellent AI primer, *The Thinking Computer* (W. H. Freeman, 1976). Educators, in particular, should be skeptical of Andreae’s suggestion that PURR-PUSS offers insights into learning and teaching. The Mew-Brain proposal may be worth serious consideration by brain theorists. Despite its limitations, it indicates one way of stepping out of the electro-chemical frame of reference. The stylized drawings of cats by Andreae’s daughter Gillian are another redeeming feature.

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VALUES AND THE FUTURE: MODELS OF COMMUNITY COLLEGE DEVELOPMENT. *By John O. Hunter.* Sherman Oaks, California: Banner Books International, 1977, 166 pp., \$8.95. (ISBN 0-89491-005-1)

The main thesis of this book is that a greater demand for educational accountability by the public creates a bureaucratic value system (characterized by more centralization of authority) which is antithetical to a more autonomous value structure appropriate for the effective operation of community colleges. Since accountability is a reality which must be faced,

community colleges must identify sets of values and developmental strategies which will accommodate bureaucratic pressures while preserving as much as possible the autonomy necessary to carry out their educational mandates. Having established this thesis, the book proceeds to develop the philosophical premises upon which to base such an approach to future college development. Unfortunately the assumptions and arguments used to establish these basic underpinnings are in most cases logically inconsistent or based on false premises. This is particularly disappointing because the operating models, conclusions, and recommendations derived from such poorly thought-out beginnings are in many cases insightful and extremely useful for practising community college administrators. Put more briefly, the book reminds me of a well-designed building sitting on a poorly engineered foundation.

As one example of this structural deficiency, Doctor Hunter readily admits to a preference for an Organizational Development approach over the Management By Objectives method of administration. However in order to justify his position, he finds it necessary to establish an artificial dichotomy between the two approaches, arguing that MBO is not compatible with a “natural systems” approach to management while OD fits very nicely with such a model. He attempts to defend such an assertion by stating that MBO is not suitable for organizations in the public sector (citing one article which agrees with this view but admitting that other students of organization including Drucker disagree with this contention) while strongly supporting the use of “natural system” (and by implication, OD) in educational institutions. MBO is narrowly described as paying insufficient attention to the values underlying an organization, as inhibiting the thinking-through of possible consequences arising from decisions, and as measuring success purely on the basis of the achievement of organizational goals. Most descriptions of MBO tend to differ greatly from the above. The implementation of MBO usually begins with the formulation of long range goals which are based upon fundamental organizational values. Job descriptions and specific objectives are only generated after the broad mission and environmental aspects of the organization are examined. Periodic reviews of consequences including nongoal-oriented effects are part of the overall process (see for example, Raia: 1974, pp. 22-32). The point of this discussion is that using an OD approach in educational institutions can be easily justified without the strained set of arguments used by the author.

Hunter advocates a greater emphasis on nonquantitative approaches to instructional evaluation and argues against the use of technology as a substitute for the fundamental role of the teacher. Again he finds it necessary to base his views on a set of tenuous assumptions and poorly developed arguments. In this case the artificial dichotomy is between teaching as an art or a science. As he puts it,

The assumption that technology would change the fundamental role of the teacher, however, is false. Technology makes teaching a science, whereas teaching has always been primarily an art. (p. 53)

Arguing that teaching was primarily an art (a doubtful proposition) and must therefore always remain an art is not in accord with either logic or observable behaviour. One can enumerate many phenomena which were considered one thing in the past and have now become something else. Flying was only for birds. Swimming underwater was done mainly by fish. Mathematics, economics, and psychology were part of philosophy, now they

are “pure” or “social” sciences. Why then can teaching not become a science?

In order to support such an assertion, Hunter uses Dewey’s aesthetic philosophy to show the connection between teaching and art. Both, he argues, are experiences, both communicate through unique languages and serve to create a dynamic, ordered, aesthetic and moral environment (p. 51). While such terms might be used to describe what occurs when someone is in contact with a truly talented and inspired teacher, it is doubtful whether most of us have had many formal learning experiences which could be described in such a way. Therefore, according to Hunter, we have not been taught.

If the fundamental role of teaching can be defined as helping students to attain desired learning objectives (a definition which seems to be generally acceptable and which is posited only because the author provides no explication of this term), there is little argument with Hunter’s conclusion; again only his premises are questionable, but *how* this fundamental role is carried out can vary a great deal. The teacher can act as a communicator of information, as a manager of educational experiences, or in countless other ways. By selecting appropriate learning strategies which take into consideration students’ interests and objectives and instructors’ strengths and weaknesses, teaching becomes a mixture of art and science.

In contrast with the previous topics, Hunter’s discussion of how a general education component might be integrated into vocational programming is very insightful. He suggests, for example, that instructors of general education courses meet regularly with faculty from vocational program areas in order to better understand the needs and interests of the students and the objectives of the program. Particularly persuasive is his argument that a liberal arts approach to general education in community colleges is not appropriate; that courses must be developed in conjunction with the vocational faculty. He believes that the future of general education in community colleges lies with staff development and that only by stimulating general scholarship rather than allowing more discipline-oriented approaches can a viable general education component be developed and maintained. Chapters on the impact of collective bargaining, evaluation, and planning also provide well thought-out policies and guidelines as well as practical suggestions relating to the implementation of such policies.

The last chapter of the book provides additional insights into Hunter’s position on general education which, as it turns out, means providing students with a set of values. Since such a view implies that there *are* universal values (a comparison with Marxian views on this subject would certainly have provided a more balanced outlook on this topic), a journey into Kantian philosophy is required. Actually, this rationale leaves the reader with the impression that the author has again indulged himself in a philosophical tour de force which has little relationship to the posited theme of the book. The net effect of this propensity to philosophize is to reduce the effectiveness of Hunter’s many excellent observations and suggestions regarding the administration of community colleges.

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STAFF DEVELOPMENT IN HIGHER EDUCATION. *Edited by Lewis Elton and Kerren Simmonds.* Surrey, England: Society for Research into Higher Education, Ltd., 1977, 166 pp.

For the Canadian academic or administrator interested in higher education the opportunity to obtain a perspective on the state of the art in Britain prompts a number of speculative questions, among them: What is the prevailing view of staff development? How are needs determined and by whom? How are programs developed and delivered? What incentives are exercised? What administrative facilitation is provided? How successful are programs in meeting objectives? How widespread is the practice? What are the unique features? . . . and so on. Obviously any single book which addresses these and other relevant questions in any detail would be a comprehensive, monumental piece of work. In the present case no such claims are made. The book is a collection of papers (or abstracts of papers) presented at the twelfth annual conference of the Society for Research into Higher Education at the University of Surrey. In its 166 pages, thirty-seven different presentations are summarized, the diversity of which is indicated by the seven thematic headings used by the editors for purposes of classification.

The book apparently serves three purposes: a record of proceedings, a source book of persons to contact for information, and, for the more ambitious, an opportunity to develop an image of a system in operation. For the Canadian reader the purpose mentioned last, while perhaps the most significant, is not facilitated by the use of insular terms such as DES, sandwich courses, the one-off course, polytechnics and the like. However, effort has its rewards.

In a short review it is not possible to comment on each included paper, but a few examples might help to reveal the interest potential of the contents. J. Stoddart of Hull College of Higher Education presented an introductory paper titled "Staff Development and Course Development in the Public Sector of Higher Education." He noted that colleges could be categorized as having been, or not having been, subject to radical change of purpose or structure in the past ten years. In the former case (e.g., polytechnics), staff development is closely linked to institutional change and curriculum development and, consequently, is more readily accepted than in more stable colleges where "there is rarely any serious attempt to appraise staff performance . . . or what will be demanded of individual staff members in the future" (p. 5). Stoddard holds the view that administrative responsibility for staff development in times of change goes beyond facilitating the individual's personal aspirations, even though this may create morale problems. "If the colleges are to fulfil their obligations and not be forced into creating wholesale redundancy, they need: 1. a realistic appraisal of present staff competencies, 2. a realistic plan for institutional development, 3. the identification of shortage areas and over-staffed areas, and 4. proposals for staff retraining" (p. 8).

Billing attempts to reconcile the interests of the individual and of the institution in a working definition of staff development which appears to have been adopted at the conference:

Staff development is a deliberate and continuous process involving the identification and discussion of present and anticipated needs of individual staff for furthering their job satisfaction and career prospects and of the institution for supporting its academic work and plans, and the implementation of

programmes of staff activities designed for the harmonious satisfaction of these needs. (p. 22)

Reference is made to societal forces which impel change in institutions including constrained resources, amalgamation of colleges, the changing graduate job market, and centralization of planning decisions (all of which have a familiar ring in Canada). Billing noted the specific influence of the Council for National Academic Awards which confers degrees earned through programs of study at polytechnics. In one of its reports it *requires* staff to engage in research and consultancy as a means of maintaining quality. Other landmark reports between 1964 and 1975 from various national committees have been taken seriously by the University community. For example one document makes it “*incumbent* upon universities to provide training for the probationer” (p. 21). (Is it hard to imagine a parallel situation in Canada?)

Warren of Leicester Polytechnic discussed the institutionalisation of staff development and confirmed, by an example, the extent to which this has progressed.

Formulation of acceptable policy in this area depends on wide ranging consultation thus the Academic Board established a committee in 1974 including the Assistant Director, the Staffing Officer, representatives of Heads of School, academic staff and non-academic staff, and representatives of relevant agencies in the Polytechnic. A policy statement on staff development for academic staff was adopted by the Academic Board on the advice of the Staff Development Committee in July 1975. (p. 28)

The policy referred to above found expression in induction courses for new staff, mandatory initial teacher education courses, the Development Discussion procedure, and training courses for Heads of School in the techniques used in the development interview. The most frequently identified development activity was research and scholarship in one's specific discipline. Other activities identified were secondments and exchanges, taking advanced degrees, in-service workshops and seminars.

Little attention is given to the development of conceptual models of staff development or to research. Fox presented a matrix for conceptualizing staff development needs in terms of the experience of the staff member and the possible roles of a professional practitioner. Hounsell mentioned a five-year program of research recently initiated at the University of Lancaster. While the focus of the research is upon student learning, findings from the project are expected to have implications for educational development of both students and teachers. Several reports of surveys of staff and student perceptions of teaching, and developmental projects aimed at improving teaching are given.

The general impression conveyed by the book is that staff development in Britain is a societal expectation which institutions have acknowledged and responded to by the creation of internal structures for its study and promotion (e.g., Institute for Research and Development in Post-Compulsory Education, University of Lancaster; Staff Development Service, Trent Polytechnic; University Teaching Methods Unit, University of London; Institute for Educational Technology, University of Surrey; Department of Educational Services, Sheffield City Polytechnic); and by institutionalization of staff development procedures and requirements. The prevailing administrative view is to relate staff development to institutional needs and to instructional improvement, whereas staff tend to equate it with discipline-based research and other scholarly activity. The

predominant delivery mechanisms are internal programs and formal course work leading to advanced qualifications. Some opportunities exist also for study leaves, exchanges, and secondments.

Interest in staff development in higher education is worldwide. This was evidenced, in a small way, by the inclusion of presenters from Canada, United States, Holland, West Germany, and Australia. Apparently, however, in Britain there is more action behind the rhetoric than in other parts.

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1. All manuscripts must be typewritten, double spaced, and submitted in duplicate. An abstract of approximately 100 words in length, typed on a separate page, should be provided.
2. Tables must be numbered in Arabic numerals with the word 'Table' centered and in capital letters, e.g., TABLE 4. The heading of the table is to be centered below and typed in capitals. The format of tables should conform to the specifications in the APA Publications Manual.
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4. Each table or figure should be presented on a separate page. The position of tables and graphs should be clearly indicated within the text by inserting at the relevant point the phrase (Insert Table 2 here).
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